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INTRODUCTION

The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. Three indexes, subject, personal author and title are provided to help the user locate reports that may be of interest.

AFOSR does not maintain copies of technical reports for distribution. However, you may obtain any of these reports if you are registered with DTIC, by requesting the AD number of that report from the DTIC, Cameron Station, Alexandria, Virginia, 22314.

PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

AFOSR MISSION

The Air Force Office of Scientific Research (AFOSR) is the Single Manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of fundamental scientific research. The AFOSR is organized under the Air Force Systems Command, DCS/Technology.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from proposals received in response to the Broad Agency Announcement originating from scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force operational capabilities, originality, significance to science, the qualification of the principal investigators, and the reasonableness of the proposed budget.

KEY TO READING THE DATA

The summaries consist of three indexes and the abstracts. From one of the indexes, locate the AD number of the report that is of interest to you. Use this number to locate the abstract of the report in the abstracts section. The first report submitted to DTIC during the quarter (the one with the lowest AD number) appears on the last page of the abstracts section. The last report submitted to DTIC during the quarter (the one with the highest DTIC number) appears on the first page of the abstracts section. The following terms will give you a brief description of the elements used in each summary of this report.

DTIC Report Bibliography - DTIC's brief description of a technical report.

Search Control Number - A number assigned by DTIC at the time a bibliography is printed.

AD Number - A number assigned to each technical report when received by the DTIC.

Field & Group Numbers - (appearing after the AD number) First number is the subject field, and the second number is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

Monitor Number - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-83-0001 is the first number used for the first technical report processed for Calendar Year 1983.

Supplementary Note - A variety of statements pertaining to a report. For example, if the report is a journal article, the supplementary note might give you the journal citation, which will include the name of the journal the article it appears in, and the volume number, date, and the page numbers of the journal.

Abstract - A brief summary describing the research of the report.

Descriptors - Key words describing the research.

Identifiers - Commonly used designators, such as names of equipment, names of projects or acronyms, the AFOSR project and task number, and the Air Force Research Program Element number.

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DESCRIPTIVE NOTE: Final technical rept. 1 Mar 88-28 Feb 91,

APR 91 312P

PERSONAL AUTHORS: Gubser, John L.; Hauenstein, Anthony J.

REPORT NO. MDC-ATN-EBE4-020

CONTRACT NO. F49620-88-C-0047

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0601, AFOSR

UNCLASSIFIED REPORT

Distribution authorized to U.S. Gov't. agencies only; Proprietary Info.; 5 Aug 91. Other requests shall be referred to AFOSR, Attn: NA. Bolling AFB, Washington, DC 20332-6448.

ABSTRACT: (U) A general analytical and experimental research activity was performed to investigate the chaotic response behavior of nonlinear dynamic systems. Chaos is the paradoxical emergence of random-like motion in completely deterministic nonlinear systems. The results of this research are applicable to a wide range of systems and extend and enhance the basic scientific understanding of chaos and nonlinear dynamics; however, it was necessary to define, develop, and utilize specific analysis and experimental models as an aid in verifying the general dynamic response prediction techniques utilized in this research activity. These models were a rigid and a flexible aerosurface each having nonlinearities in their root support structures. These aerosurfaces were analyzed and tested in low speed wind tunnels and the analysis and test results correlated. This report summarizes the analysis techniques, models, testing, and results from this activity. Five types of

AD-B156 876L

AD-B156 876L CONTINUED

oscillatory response were observed in the analytical and experimental results for the aerosurface models; (1) damped decay, (2) chaotic sustained oscillations, (3) nonharmonic sustained oscillations, (4) harmonic limit cycle sustained oscillations, and (5) flutter.

DESCRIPTORS: (U) , DAMPING, DECAY, DETERMINANTS(MATHEMATICS), DYNAMIC RESPONSE, DYNAMICS, EXPERIMENTAL DESIGN, FLUTTER, LOW VELOCITY, MODELS, NONLINEAR SYSTEMS, OSCILLATION, PREDICTIONS, RANGE(EXTREMES), RESPONSE, STRUCTURAL PROPERTIES, STRUCTURES, SUPPORTS, TEST AND EVALUATION, WIND TUNNELS.

IDENTIFIERS: (U) *Chaos, *Nonlinear systems, Dynamic response, Structural response, Wind tunnel tests, Random motion, *Aerodynamics, *Surfaces, Damping, Oscillation, PE61102F, WUAFOSR2302B.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-B158 558L 20/7

UKAEA CULHAM LAB ABINGDON (UNITED KINGDOM) AEA INDUSTRIAL TECHNOLOGY

(U) Particle Beams for Defence.

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-31 Jan 91,

MAY 91 131P

PERSONAL AUTHORS: McAdams, R.

REPORT NO. AEA-InTec-0514

CONTRACT NO. F49620-88-C-0064

PROJECT NO. DO51

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0591, AFOSR

UNCLASSIFIED REPORT

Distribution authorized to U.S. Gov't. agencies only; Test and Evaluation; 26 Jul 91. Other requests shall be referred to AFOSR, Attn: NP, Bolling AFB, Washington, DC 20332-6448.

ABSTRACT: (U) The Particle Beams for Defence programme has been aimed at developing the continuous wave injector physics and technology, based on the volume negative ion source, necessary for the NPB miss'on. The broad conclusions of the programme are that: Pure volume sources are able to produce, at present, current densities of H- ions of up to 25-30 mA/sq cm with effective beam ion temperatures of approximately 1.5 - 2. 0 eV resulting in a brightness of approximately 15 A/(cm-mrad)sq. The problem of suppression of the extracted electrons is well understood and efficient suppressors can be designed. The sources operate continuous wave and are essentially noise free. The D- current performance is reduced by approximately a factor of two from the H- current performance and the emittance is reduced by a smaller factor of about 0.3. This is without reoptimisation of the source for deuterium operation. The c.w. beam can be transported to the match point of an RFQ and for the range of parameters investigated there is no

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evidence of significant emittance growth in the LEBT. Stripping of the ion beam plays an important role in the understanding of aperture scaling of current and must be carefully considered in the design of the injector. We have determined how to do this. Additives to the ion source, eg. Aluminium, can produced enhanced current performance, and the emittance is increased by abberations at the plasma boundary.

DESCRIPTORS: (U) , ADDITIVES, ALUMINUM, ANIONS, BOUNDARIES, CONTINUOUS WAVES, DEFENSE SYSTEMS, DENSITY, DEUTERIUM, EFFICIENCY, ELECTRONS, EMITTANCE, EXTRACTION, GROWTH(GENERAL), INJECTORS, ION BEAMS, ION SOURCES, IONS, OPERATION, PARAMETERS, PARTICLE BEAMS, PHYSICS, PLASMAS(PHYSICS), PURITY, SOURCES, SUPPRESSION, SUPPRESSORS, TEMPERATURE, VOLUME.

IDENTIFIERS: (U) *Particle accelerator components, *Ion sources, Neutral particle beams, PE61102F, WUAFOSRDO51A1.

AD-B158 558L

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-B158 503L 20/3

ADVANCED MATERIALS CORP PITTSBURGH PA

(U) Low-Cost, High Torque-to-Weight Ratio Permanent Magnet Motors, Actuators and Sensors.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 89-30 May 90,

JAN 91 15P

PERSONAL AUTHORS: Sankar, S. G.; Simizu, S.; Pouarian, F.

MONITOR: AFOSR TR-91-0203

UNCLASSIFIED REPORT

Distribution authorized to DoD only; Critical Technology; 15 Jul 91. Other requests shall be referred to Strategic Defense Initiative Organization, Washington, DC 20301-7100.

ABSTRACT: (U) Several permanent magnets were fabricated from Pr-Fe-Co-B which exhibit energy products above 35 MGOe at room temperature. They were fabricated employing conventional powder metallurgical techniques. These magnets exhibit more than 48 MGOe at 4.2 K. Finite element analyses were performed to optimize the design of a brushless motor using these magnets. During this reporting period, we have completed the design studies and we have also built a first generation brushless motor. The back emf generated during the operation of the motor agrees with the values expected from the finite element analyses. A second generation motor is planned for construction during the second year of the contract. In the new design, a sensorless commutation technique will be used. This will allow us to cool the motor down to liquid nitrogen temperatures and examine the operation of the motor at these cryogenic temperatures.

DESCRIPTORS: (U) , ACTUATORS, BRUSHLESS ELECTRICAL EQUIPMENT, CRYOGENICS, DETECTORS, ELECTRIC MOTORS, ELECTRONIC COMMUTATORS, ENERGY, FINITE ELEMENT ANALYSIS, LIQUID NITROGEN, LOW TEMPERATURE, MAGNETS, MOTORS, OPERATION, PERMANENT MAGNETS, POWDER METALLURGY, ROOM TEMPERATURE, TEMPERATURE.

IDENTIFIERS: (U) *Parmanent magnets, *Motors.

AD-B158 502L 6/5

MEHARRY MEDICAL COLL NASHVILLE TN

(U) Assaying the Effects of Sublethal Industrial Toxicant Concentrations on Cultured Adrenal Cells.

DESCRIPTIVE NOTE: Annual rept. 15 MAy 90-14 May 91,

JUN 91 104P

PERSONAL AUTHORS: Mrotek, James T.

CONTRACT NO. F49620-89-C-0058

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-91-0813

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by AFOSR/XOTD, Bldg 410, Bolling AFB, DC 20332, 18 Jul 91 or higher DoD authority.

DESCRIPTORS: (U) , ADRENAL GLANDS, ADRENOCORTICOTROPIC HORMONE, ASSAYING, BARBITURATES, CADMIUM, CELLS, CHLORIDES, CONCENTRATION(COMPOSITION), CULTURE, INCUBATION, INDUSTRIES, LONG RANGE(TIME), MEMBRANES, PLASMAS(PHYSICS), REPRODUCIBILITY, SENSE ORGANS, SUBLETHAL DOSAGE, TIME, TOBACCO PLANTS, TOXIC AGENTS.

IDENTIFIERS: (U) *Adrenal, *Toxic chemicals, Steroidogenesis, Cell culture, *Cell morphology, Subcellular orgenelle morphology, WUAFOSR2312A5, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-B156 243L 20/8 7/4

LASER PHOTONICS TECHNOLOGY INC AMHERST NY

(U) A Novel Second Harmonic Generator for Photonics Using Multifunctional Nonlinear Waveguides.

DESCRIPTIVE NOTE: Final rept. 1 Jul 90-15 May 91,

MAY 91 31P

PERSONAL AUTHORS: Burzynski, Ryszard; Casstevens, Martin

REPORT NO. AFOIO-FROLPT(91)

CONTRACT NO. F49620-90-C-0052

PROJECT NO. 1602

TASK NO. F1

MONITOR: AFOSR, XF
TR-91-0588, AFOSR

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by Air Force Office of Scientific Research, Bolling AFB, Washington, DC 20332, 2 Jul 91 or higher DoD authority.

DESCRIPTORS: (U) , CONTROL, EFFICIENCY, ELECTRONICS, ELECTROOPTICS, FIBERS, GLASS, HARMONIC GENERATORS, INORGANIC MATERIALS, INTEGRATED SYSTEMS, MECHANICAL PROPERTIES, MEDICINE, MODULATION, MULTIMODE, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, ORGANIC COMPOUNDS, OXIDES.

IDENTIFIERS: (U) *Nonlinear waveguides, *Harmonic generators, *Photonics, Sol-Gel films, Integrated optics, WUAFOSR1602F1.

AD-B156 201L 9/1

PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS RESEARCH LAB

(U) Quantitative Analysis of Thin Film Morphology.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 87-30 Jun 90,

MAR 91 14P

PERSONAL AUTHORS: Messier, Russell

CONTRACT NO. AFOSR-87-0343

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0562, AFOSR

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by Air Force Office of Scientific Research, Bolling AFB, DC 20332; 10 Jul 91 or higher DoD authority.

DESCRIPTORS: (U) , AMORPHOUS MATERIALS, CARBON, ELLIPSOMETERS, EVOLUTION(GENERAL), EXPERIMENTAL DATA, EXTERNAL, FILMS, GEOMETRY, GERMANIUM, GROWTH(GENERAL), INTERNAL, ION BOMBARDMENT, LENGTH, MATHEMATICS, MODELS, MORPHOLOGY, QUANTITATIVE ANALYSIS, REAL TIME, SCALE, SPECTROSCOPY, SURFACES, THIN FILMS.

IDENTIFIERS: (U) *Thin films, *Morphology, *Quantitative analysis, Fractals, WUAFOSR2306B1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-B156 176L 11/2 20/12

OAK RIDGE NATIONAL LAB TN

(U) Structures and Properties of Compositionally Modulated Ceramics.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-30 Sep 90,

NOV 90 44P

PERSONAL AUTHORS: McKee, R. A.

CONTRACT NO. AFOSR-ISSA-88-0012, AFOSR-ISSA-89-0015

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0579, AFOSR

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by AFOSR, Program Manager, Electronics and Materials Sciences Directorate, Bolling AFB, Washington, DC 20332-6448.

DESCRIPTORS: (U) , CERAMIC MATERIALS, ELECTRICAL PROPERTIES, EPITAXIAL GROWTH, FILMS, GRAIN SIZE, GROWTH(GENERAL), LAYERS, MECHANICAL PROPERTIES, MICROSTRUCTURE, MODULATION, MOLECULAR BEAMS, OPTICAL PROPERTIES, OXIDES, SILICON, STRUCTURES, TWO DIMENSIONAL.

IDENTIFIERS: (U) Molecular beam epitaxy, *Epitaxial growth, *Thin films, *Ceramic materials, *Oxides, Single crystals, Deposition, PE61102F, WUAFOSR2306A2.

AD-B156 087L 11/9 20/2

FOSTER-MILLER INC WALTHAM MA

(U) Expert System Control of Orientation in Ordered Polymers for NLO Applications.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 88-30 Nov 90,

APR 91 60P

PERSONAL AUTHORS: Druy, Mark A.; Augeri, Mark; Levin, Philip

REPORT NO. AFB-0018-FM-8961-454

CONTRACT NO. F49620-89-C-0018

PROJECT NO. 8961

TASK NO. AA

MONITOR: AFOSR, XF
TR-91-0611, AFOSR

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by AFOSR, Bolling AFB, Washington, DC 20332-6448, 12 Jul 91 or higher DoD authority.

DESCRIPTORS: (U) , ALIGNMENT, CONTROL, CONTROL SYSTEMS, DETECTORS, EXPERT SYSTEMS, HISTORY, LIQUID CRYSTALS, MEASUREMENT, MOLECULES, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, ORDER DISORDER TRANSFORMATIONS, ORIENTATION(DIRECTION), PHYSICAL PROPERTIES, POLYMERS, PROCESSING, SENSITIVITY, SHEAR PROPERTIES, VARIABLES, WIDE ANGLES, X RAY DIFFRACTION.

IDENTIFIERS: (U) *Polymers, *Liquid crystals, *Symmetry(Crystallography), Polyphenylenes, Benzyl radicals, Azoles, Polyphenylene benzobis oxazole, Polyphenylene benzobis thiazole, Thiazoles, Nonlinear optical properties, Crystal structure.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 373 12/4 22/2

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS DIV

(U) OPUS: Optimal Projection for Uncertain Systems. Volume 2.

DESCRIPTIVE NOTE: Final rept. 15 Oct 88-30 Sep 91,

SEP 91 425P

PERSONAL AUTHORS: Bernstein, Dennis S.; Haddad, Wassim M.

CONTRACT NO. F49620-89-C-0011

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0755, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A240 372.

ABSTRACT: (U) OPUS (Optimal Projection for Uncertain Systems) is a unified approach to control-system design and analysis for high-performance, multivariable applications such as large flexible space structures. OPUS yields low-order, robust controllers that meet both time-and frequency-domain objectives. This final report discusses progress achieved during the previous three years in the areas of robust control, fixed-structure control, sampled-data control, tracking control, and nonlinear control. The appendices in this volume include reprints on the following topics: Controller design with regional pole constraints; Optimal output feedback for nonzero set point regulation; Inequalities for the trace of matrix exponentials; Reduced-order multirate estimation for stable and unstable plants; Nonquadratic cost and nonlinear feedback control; some open problems in matrix theory arising in linear systems and controls; small gain vs. positive real modeling of real parameter uncertainty; and compartmental modeling and power flow analysis for state space systems.

DESCRIPTORS: (U) , CONTROL, COSTS, ESTIMATES, FEEDBACK, FLEXIBLE STRUCTURES, FLOW, GAIN, LINEAR SYSTEMS, MATRIX

AD-A240 373

AD-A240 373 CONTINUED

THEORY, MODELS, MULTIVARIATE ANALYSIS, NONLINEAR SYSTEMS, OPTIMIZATION, OUTPUT, PARAMETERS, POWER, RATES, REDUCTION, REPRINTS, SAMPLING, SPACE SYSTEMS, SPACECRAFT, TRACKING, UNCERTAINTY, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, *OPUS(Optimal Projection for Uncertain Systems), *Flexible structures, *Multivariate analysis, *Control theory, Space stations, *Control systems, Optimization, Uncertainty, Lyapunov functions, Large space structures, Time domain, Frequency domain, Robust stability.

AD-A240 373

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 372 12/4 22/2

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS DIV

(U) OPUS: Optimal Projection for Uncertain Systems. Volume 1.

DESCRIPTIVE NOTE: Final rept. 15 Oct 88-30 Sep 91,

SEP 91 368P

PERSONAL AUTHORS: Bernstein, Dennis S.; Haddad, Wassim M.

CONTRACT NO. F49620-89-C-0011

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0754, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A240 373.

ABSTRACT: (U) OPUS (Optimal Projection for Uncertain Systems) is a unified approach to control-system design and analysis for high-performance, multivariable applications such as large flexible space structures. OPUS yields low-order, robust controllers that meet both time-and frequency-domain objectives. This final report discusses progress achieved during the previous three years in the areas of robust control, fixed-structure control, sampled-data control, tracking control, and nonlinear control. The appendices in this volume include reprints on the following topics: Optimal projection approach to robust fixed-structure control design; combined L sub 2 H sub infinity model reduction; Robust stability and performance analysis for linear dynamic systems; Robust stability and performance via fixed-order dynamic compensation; Finite-dimensional approximation for optimal fixed-order compensation of distributed parameter systems; Minimal complexity control law synthesis; singular linear-quadratic regulator problem and the Goh-Riccati equation.

DESCRIPTORS: (U) , CONTROL, CONTROL THEORY, DISTRIBUTION, DYNAMICS, FLEXIBLE STRUCTURES, LINEAR SYSTEMS, MODELS,

AD-A240 372

AD-A240 372 CONTINUED

MULTIVARIATE ANALYSIS, NONLINEAR SYSTEMS, OPTIMIZATION, PARAMETERS, PERFORMANCE TESTS, QUADRATIC PROGRAMMING, REDUCTION, REGULATORS, REPRINTS, SAMPLING, SIZES(DIMENSIONS), SPACECRAFT, SYNTHESIS, TRACKING, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, *OPUS(Optimal Projection for Uncertain Systems), *Flexible structures, *Multivariate analysis, *Multivariate analysis, *Control theory, Space stations, *Control systems, Optimization, Uncertainty, Feedback, Large space structures, Time domain, Frequency domain, Riccati equation, Robust stability.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 370 5/8

ILLINOIS UNIV AT URBANA DEPT OF PSYCHOLOGY

(U) Reminding-Based Learning.

DESCRIPTIVE NOTE: Annual rept. 21 Jun 90-20 Jun 91,

AUG 91 16P

PERSONAL AUTHORS: Ross, Brian H.

CONTRACT NO. AFOSR-89-0447

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0758, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) When learning new cognitive skills involving problem solving, novices are often reminded of earlier problems. The use of earlier problems is a common means of problem solving and affects the learning of the skill. This project has three aims in understanding this learning. First, the representation of the resulting generalizations is being examined. Generalizations formed from remindings are likely to be conservative, in that they may be more tied to the examples than many current theories allow. A main aim of the project is to distinguish and test different forms of this conservatism. Second, the development of problem solving expertise is examined by focusing on differences in how typical and atypical problems are solved. Third, the effects of such reminding-based learning in everyday problem solving is examined to extend the findings and test some theoretical ideas that are difficult to investigate in more formal domains.

DESCRIPTORS: (U) , COGNITION, LEARNING, PROBLEM SOLVING, SKILLS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

AD-A240 370

AD-A240 369 20/11

VIRGINIA UNIV CHARLOTTESVILLE

(U) Large Deformation Induced Failures in Nonlinear Solids.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Jul 91,

JUL 91 10P

PERSONAL AUTHORS: Horgan, Cornelius O.

CONTRACT NO. AFOSR-89-0470

MONITOR: AFOSR, XF
TR-91-0751, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This work is concerned with the fundamental mechanics and mathematics of large deformation induced failures in nonlinear solids. The specific area investigated was that of void nucleation and growth due to large deformation in nonlinear solids. Research on cavitation phenomena, which serve as a precursor to fracture, is crucial to understanding failure mechanisms in rubber-like solids. (e.g. polymers, solid rocket propellants) and of ductile fracture processes in metals. Mathematically, the work involved investigation of singular solutions of the second-order quasilinear system of partial differential equations describing equilibrium states of nonlinearly elastic bodies. For radially symmetric deformations, the basic problem reduces to a bifurcation problem for a single second-order nonlinear ordinary differential equation. Particular emphasis was placed on the effect of material inhomogeneity, compressibility and anistropy on void nucleation and growth. Studies on the micromechanics of particles, in particular the correlation of inclusions to void formation, are receiving much attention from the solid mechanics, applied mathematics and materials science communities. The work has impact on failure mechanisms due to large deformations in anisotropic and composite materials. Compared to the vast amount of information available on small deformations of such materials, results on large deformations remain virtually unexplored. Considerations of large deformations in anisotropic or composite materials often lead to striking differences from predictions of corresponding linearized theories.

AD-A240 369

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 389 CONTINUED

DESCRIPTORS: (U) , ANISOTROPY, APPLIED MATHEMATICS, CAVITATION, COMMUNITIES, COMPOSITE MATERIALS, DEFORMATION, DIFFERENTIAL EQUATIONS, DUCTILITY, ELASTIC PROPERTIES, FAILURE, FRACTURE(MECHANICS), HETEROGENEITY, IMPACT, LINEARITY, MATERIALS, MATHEMATICS, MECHANICS, METALS, NONLINEAR SYSTEMS, NUCLEATION, PARTIAL DIFFERENTIAL EQUATIONS, PARTICLES, POLYMERS, PRECURSORS, RUBBER, SOLID ROCKET PROPELLANTS, SOLIDS, SOLUTIONS(GENERAL), SYMMETRY, THEORY, VOIDS.

IDENTIFIERS: (U) *Failure(Mechanics), *Solids, Nonlinear solids, Voids, Bifurcation(Mathematics), Compressive properties, Anisotropy, *Deformation.

IAC NO. PL-055649

IAC DOCUMENT TYPE: PLASTC - MICROFICHE --

IAC SUBJECT TERMS: P--(U)NONLINEAR ANALYSIS, LARGE DEFORMATIONS, FAILURE, NUCLEATION, VOIDS, ANISOTROPY, BIFURCATION, SOLID PROPELLANTS, THERMOPLASTICS, STRESS CONCENTRATION, PROPELLANT BINDERS, ELASTIC PROPERTIES, FRACTURE TOUGHNESS, BINDERS, DUCTILITY, ZZ UNLIMITED.;

AD-A240 366 5/2

YALE UNIV NEW HAVEN CT DEPT OF PSYCHOLOGY

(U) Long Term Synaptic Plasticity and Learning in Neuronal Networks.

DESCRIPTIVE NOTE: Annual rept. (Final) 1 Oct 88-30 Sep 91,

AUG 91 12P

PERSONAL AUTHORS: Brown, Thomas H.

CONTRACT NO. AFOSR-89-0047

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XF .
TR-91-0727, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this project was to understand a form of synaptic plasticity, called long-term potentiation (LTP), that appears to be a good candidate mechanism for rapid learning in mammals. LTP is a persistent form of synaptic enhancement that can be rapidly induced by brief periods of stimulation. As this project evolved, I focused on four aims: (1) methods for studying mechanisms underlying LTP expression in the hippocampus; (2) using these methods to elucidate the mechanisms; (3) developing a suitable system for evaluating the role of LTP in learning; (4) developing and applying methods of computational neuroscience to create a learning theory that is grounded in principles of cellular neurophysiology.

DESCRIPTORS: (U) , CELLS, HIPPOCAMPUS, LEARNING, MAMMALS, NERVE CELLS, NETWORKS, NEUROPHYSIOLOGY, OPTIMIZATION, PLASTIC PROPERTIES, STIMULATION(GENERAL), SYNAPSE, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 365 13/8 12/1

COLLEGE OF WILLIAM AND MARY WILLIAMSBURG VA DEPT OF MATHEMATICS AND COMPUTER SCIENCE

(U) Algebraic Aspects of Network Reliability Problems.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 May 91,

MAY 91 10P

PERSONAL AUTHORS: Shier, Douglas R.

CONTRACT NO. AFOSR-89-0071

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0717, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research addresses both theoretical and computational aspects of evaluating the reliability of a complex system in terms of its structure and the reliability of its individual components. This type of problem frequently arises in the design and evaluation of telecommunication, logistics, and distribution systems, which are commonly modelled using networks. The present research employs an algebraic approach for studying the reliability of such network systems. This approach has not only unified a variety of theoretical results but has also produced a number of new algorithms for calculating various measures of system reliability. Based on this approach, both exact and approximate computational schemes have been developed, together with supporting data structures for implementing the necessary computations in an efficient manner. Approximation schemes, also based on an underlying algebraic structure, have also been developed for evaluating more general measures of system performance, such as average delay or throughput in stochastic systems. In addition this research has recently led to the study of efficient methods for generating cutsets in networks and has produced substantial improvements relative to existing methods for this fundamental task. (Author)

DESCRIPTORS: (U) , ALGEBRA, ALGORITHMS, COMPUTATIONS,

AD-A240 365

AD-A240 365 CONTINUED

DATA BASES, EFFICIENCY, LOGISTICS, NETWORKS, RELIABILITY, STOCHASTIC PROCESSES, TELECOMMUNICATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, *Network reliability, *Algebra, Distributed systems, Telecommunications.

AD-A240 365

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 364 12/9

NEW YORK UNIV NY DEPT OF PSYCHOLOGY

(U) Perception and Memory of Pictures.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 89-30 Jun 90,

AUG 91 15P

PERSONAL AUTHORS: Snodgrass, Joan G.

CONTRACT NO. AFOSR-89-0442

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0739, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research is concerned with perception and memory of pictures. The theoretical motivation behind the experiments vary from area to area: in some cases, we want to test predictions of a connectionist model for picture recognition; in others we want to compare pictures with words to determine whether the two surface forms are understood at the same rate; in still others, the pictures are used as a vehicle to study questions about implicit memory. Although there are five areas of research, here I will mention highlights from only two. In the area of perception, interference in identification of a degraded image occurs when even more degraded images of the same object precede it. We tested, and rejected, the explanation proposed by Bruner and Potter that erroneous hypotheses about the object's identity interfere with subsequent recognition in favor of the explanation generated by our connectionist model. This explanation holds that transient activation of perceptual features common to the target and its distractors reduces the signal-to-noise ratio and causes interference. We were able to eliminate interference by having subjects solve math problems between presentations of the more degraded images. In the area of implicit memory, we found that the best priming stimulus for subsequent identification was a moderately fragmented, as compared to a very fragmented or almost complete stimulus. We developed the perceptual closure hypothesis to account

AD-A240 364

AD-A240 364 CONTINUED

for this effect -- it says that the more difficult perceptual closure or completion of the fragmented figure is to achieve, the more priming occurs, as along as closure is finally achieved.

DESCRIPTORS: (U) , ACTIVATION, CLOSURES, FRAGMENTATION, HYPOTHESES, MATHEMATICS, MEMORY DEVICES, MOTIVATION, PERCEPTION, PICTURES, PREDICTIONS, PRIMERS, RECOGNITION, STIMULI, TEST AND EVALUATION, TRANSIENTS, VEHICLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, *Visual perception, Pattern recognition, Image processing, Connectionist model.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 363 6/5

ILLINOIS UNIV AT URBANA DEPT OF VETERINARY BIOSCIENCES

(U) A Comparative Study Regarding the Association of Alpha-2U Globulin with the Nephrotoxic Mechanism of Certain Petroleum-Based Air Force Fuels.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 90-30 Jun 91,

AUG 91 5P

PERSONAL AUTHORS: Eurell, Thomas E.

CONTRACT NO. AFOSR-90-0303

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0752, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Adult male rats have a dose and time dependent renal proximal tubular degeneration induced by certain hydrocarbon compounds. This degeneration is associated with a low molecular weight urinary protein called alpha 2U globulin. We are using rat strain variation (Fisher 344 and NCI Black Reiter) and different hydrocarbon compounds (JP-4, JP-8, decalin and trimethylpentane) to investigate the hydrocarbon-induced nephrotoxic response. Preliminary histochemical and morphometric evaluation of NCI-Black Reiter rats exposed to JP-8 suggests that this strain undergoes an intermediate form of the hydrocarbon-induced nephrotoxicity when compared to the albino Fisher 344 strain.

DESCRIPTORS: (U) , ADULTS, AIR FORCE, BIODETERIORATION, FUELS, HYDROCARBONS, MALES, PETROLEUM PRODUCTS, RATS, STRAINS(BIOLOGY), TUBULAR STRUCTURES, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A240 359 3/2

YALE UNIV NEW HAVEN CT CENTER FOR SOLAR AND SPACE RESEARCH

(U) Development of a System for Accurate Forecasting of Solar Activity.

DESCRIPTIVE NOTE: Final rept. 15 Oct 87-14 Oct 90,

JUL 91 14P

PERSONAL AUTHORS: Sofia, Sabatino

CONTRACT NO. AFOSR-88-0054

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0728, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This is a continuing effort which has empirical, theoretical and experimental components related to the physics of solar activity. The empirical forecasting scheme, developed under this grant, has been very successful for solar cycle 22. Important elements of a highly sophisticated theoretical scheme to model the solar activity cycle have been produced and tested. The Solar Disk Sextant experiment is progressing well. In addition to the Principal Investigator, this work involves five students and two research associates.

DESCRIPTORS: (U) , ACCURACY, FORECASTING, MODELS, PHYSICS, SOLAR ACTIVITY, SOLAR CYCLE, STUDENTS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2311A1, *Solar activity, Solar physics, *Forecasting, Solar cycles.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 358 12/3

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Perceptual Grouping and Shape from Texture.

DESCRIPTIVE NOTE: Final rept. 1 Dec 89-30 Nov 90,

NOV 90 3P

PERSONAL AUTHORS: Ahuja, Narendra

CONTRACT NO. AFOSR-90-0061

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-91-0721, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the progress made during the year 1990 under grant AFOSR-90-0061. During the grant period of December 1989 to November 1990, we have concentrated on the projects on motion through textured environment and perceptual structure and reliable computing. In the first project, we have made process on the estimation of three-dimensional structure from (1) two perspective, monocular views of a dynamic scene and (2) a sequence of perspective, monocular views of a dynamic scene. Towards (1), we have developed an algorithm that estimates the three-dimensional motion and structure of a moving piecewise textured surface from two perspective views. The algorithm has two major steps. Here, the local planar nature of the surface is used to obtain polynomial expressions for image plane displacements of features. Using regions as moving features, the image is segmented using Hough transform such that the regions in each segment have the same polynomial coefficients. The values of these coefficients and region properties (e.g., area) are then used to identify region correspondences. In the second step, for each planar surface, the region correspondences are used to compute the corresponding motion parameters and surface orientation in closed form.

DESCRIPTORS: (U) , ALGORITHMS, COEFFICIENTS, DISPLACEMENT, DYNAMICS, ENVIRONMENTS, ESTIMATES, IMAGES,

AD-A240 358 CONTINUED

MOTION, PARAMETERS, PERCEPTION, PLANAR STRUCTURES, POLYNOMIALS, REGIONS, SEQUENCES, STRUCTURES, SURFACES, TEXTURE, THREE DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 329 12/5 22/2 22/5

SOUTH CAROLINA UNIV COLUMBIA

(U) Distributed Memory Computing Conference (5th) Held in Charleston, South Carolina on April 3-12, 1990. Proceedings Volume 2. Architectures, Software Tools and Other General Issues.

DESCRIPTIVE NOTE: Final rept.,

APR 90 876P

PERSONAL AUTHORS: Walker, David W.; Stout, Quentin F.

CONTRACT NO. AFOSR-90-0212

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0738-VOL-2, AFOSR

UNCLASSIFIED REPORT

Availability: IEEE Computer Society Press, 10662 Los Vagueros Circle, P.O. Box 3014, Los Alamitos, CA 90720-1264. $190.00 per set, Volume 1 and 2. No copies furnished by DTIC/NTIS.

SUPPLEMENTARY NOTE: See also Volume 2, AD-A240 328.

ABSTRACT: (U) Contents: Overviews; Dual ported memory computers; Shared memory; Other hardware and architectures; Distributed computing; Communication systems; Routing; Fault tolerance; Matrix decomposition and allocation; Data allocation and mapping; Dynamic load balancing for spatial domains; Load distribution; Data parallel programming; Object oriented programming; Automatic exploitation of parallelism; Parallel languages; Software development tools; Performance monitoring and profiling; Performance evaluation and analysis; Communication performance; Embeddings; Database and file systems; Education; Minisymposium on fault tolerance in real-time distributed memory computing.

DESCRIPTORS: (U) , ALLOCATIONS, COMMUNICATION AND RADIO SYSTEMS, COMPUTER PROGRAMMING, COMPUTER PROGRAMS, COMPUTERS, DATA BASES, DISTRIBUTED DATA PROCESSING,

AD-A240 329

AD-A240 329 CONTINUED

DISTRIBUTION, DYNAMIC LOADS, FAULT TOLERANCE, LANGUAGE, LOAD DISTRIBUTION, MEMORY DEVICES, MONITORING, PARALLEL ORIENTATION, PARALLEL PROCESSING, PERFORMANCE TESTS, REAL TIME, SOUTH CAROLINA, SYMPOSIA, TIME SHARING.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F, *Computer architecture, *Software engineering, *Symposia, *Computations, *Spacecraft, Distributed data processing.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 328 12/1 22/2 22/5

SOUTH CAROLINA UNIV COLUMBIA

(U) Distributed Memory Computing Conference (5th) Held in Charleston, South Carolina on April 8-12, 1990. Proceedings Volume 1. Applications.

DESCRIPTIVE NOTE: Final rept.,

APR 90 857P

PERSONAL AUTHORS: Walker, David W.; Stout, Quentin F.

CONTRACT NO. AFOSR-90-0212

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0737-VOL-1, AFOSR

UNCLASSIFIED REPORT

Availability: IEEE Computer Society Press, 10662 Los Vagueros Circle, P.O. Box 3014, Los Alamitos, CA 90720-1264. $190.00 per set, Volume 1 and 2. No copies furnished by DTIC/NTIS.

SUPPLEMENTARY NOTE: See also Volume 2, AD-A240 329.

ABSTRACT: (U) Contents; Expert systems; Alternate applications; Multi target tracking; Simulation of systems and discrete events; Path planning and navigation; Data and image processing; Computer vision; Ray tracing; Sorting; Mathematical methods; Full and Banded matrix algorithms; Sparse matrix algorithms; Tridiagonal systems; Basic algorithms; Monte Carlo physics; Electromagnetic scattering problems; Plasma physics applications; Computational fluid dynamics; Other scientific applications; Structural analysis; Partial differential equation methods; Mini-symposium on concurrent simulation paradigms.

DESCRIPTORS: (U) , ALGORITHMS, COMPUTATIONS, COMPUTER VISION, DISTRIBUTION, ELECTROMAGNETIC PROPERTIES, ELECTROMAGNETIC SCATTERING, EXPERT SYSTEMS, FLUID DYNAMICS, IMAGE PROCESSING, MEMORY DEVICES, MODELS, MONTE CARLO METHOD, NAVIGATION, NUMERICAL METHODS AND

AD-A240 328 CONTINUED

PROCEDURES, PARTIAL DIFFERENTIAL EQUATIONS, PATHS, PHYSICS, PLANNING, PLASMAS(PHYSICS), RAY TRACING, SIMULATION, SOUTH CAROLINA, SPARSE MATRIX, STRUCTURAL ANALYSIS, SYMPOSIA, TARGETS, TRACKING.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F, *Applied mathematics, *Computations, *Symposia, *Spacecraft, Prototypes, Distributed data processing.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 310 20/13 20/2 11/2 8/7

ISRAEL ATOMIC ENERGY COMMISSION YAVNE SOREQ NUCLEAR RESEARCH CENTRE

(U) A Statistical Physics Analysis of Rock and Concrete Damage Response.

DESCRIPTIVE NOTE: Annual technical rept. 15 Apr 90-14 Apr 91,

MAY 91 170P

PERSONAL AUTHORS: Englman, R.; Jaeger, Z.

REPORT NO. CONTR-103/90

CONTRACT NO. AFOSR-89-0374

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR, XF
TR-91-0659, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In our thermodynamic approach, crack densities have been treated as a hierarchy of order parameters operating at successively smaller scales (from macroscopic down to microcrack scales). The formulism renormalize surface energy densities due to interaction between microcracks, yields by thermodynamic self-consistency effective elastic constants (similar to those in effective medium approximations) and stress intensity factors (SIF) in cracked solids and provides thermodynamic definitions for observables (like R-curves and SIF). The fracture behavior under fixed grip or constant stress conditions has been studied numerically. Above a critical strain the material attains an equilibrium non-zero crack density that approaches the percolation threshold asymptotically with increasing strain. The effects of crack crack interactions of anisotropic crack-density and of pre-existing pores have also been studied. Crack propagation in ceramic materials, subject to microcrack formation and coalescence, has been examined with models that differ in the relative time scale involved in the internal relaxation processes and the external loading rate. It was found that when the

AD-A240 310 CONTINUED

external loading rate is high, a rising R-curve is obtained, which is primarily due to microcrack shielding.

DESCRIPTORS: (U) , APPROXIMATION(MATHEMATICS), CERAMIC MATERIALS, COALESCENCE, CONCRETE, CRACK PROPAGATION, CRACKS, DAMAGE, DENSITY, EQUILIBRIUM(GENERAL), EXTERNAL, FRACTURE(MECHANICS), HIERARCHIES, INTENSITY, INTERACTIONS, INTERNAL, MICROCRACKING, PARAMETERS, PERCOLATION, PHYSICS, RATES, RELAXATION, RESPONSE, SCALE, SHIELDING, SOLIDS, STATISTICAL ANALYSIS, STRESSES, SURFACE ENERGY, THERMODYNAMICS, THRESHOLD EFFECTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C2, *Concrete, *Rock, Reinforced concrete, *Cracking(Fracturing), Microcracking, *Crack propagation, Stress strain relations, Fracture(Mechanics), Porosity, Entropy, Lattic dynamics, Fragmentation, Defects(Materials), Thermophysical properties, Damage assessment.

AD-A240 310

AD-A240 288 12/1

CONNECTICUT UNIV STORRS DEPT OF MATHEMATICS

(U) Convergence and Performance of Synchronous and Asynchronous Parallel and Conventional Iterative Methods.

DESCRIPTIVE NOTE: Final rept. 1 Nov 87-30 Jun 91,

AUG 91 29P

PERSONAL AUTHORS: Neumann, Michael

CONTRACT NO. AFOSR-88-0047

MONITOR: AFOSR, XF
TR-91-0750, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Parallel and Sequential Iterative Methods for Linear and Nonlinear Systems. Much of the work on this topic concentrated on the convergence and rate of convergence of parallel asynchronized methods for solving linear systems arising, on the one hand, from the numerical solution to partial differential equations and, on the other hand, from least squares solution to rectangular systems which arise in application such as image reconstruction from incomplete tomographical data. The mathematics behind the analysis of these two applications of the asynchronized parallel methods is quite different. Recently they have been able to extend their convergence results to asynchronized methods for solving nonlinear systems. One application now consists of tomographic reconstruction from incomplete data where the image is constrained to lie in a bounded convex set such as an n dimensional box.

DESCRIPTORS: (U) , BOXES, CONVERGENCE, CONVEX SETS, ITERATIONS, LEAST SQUARES METHOD, LINEAR SYSTEMS, MATHEMATICS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, PARALLEL ORIENTATION, PARTIAL DIFFERENTIAL EQUATIONS, RECTANGULAR BODIES, SEQUENTIAL ANALYSIS, SIZES(DIMENSIONS), SOLUTIONS(GENERAL).

IDENTIFIERS: (U) *Iterations, *Linear systems, *Nonlinear systems, *Problem solving.

AD-A240 288

AD-A240 249 12/1

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Fast Algorithms for Linear Least-Squares Estimation of Multi-Dimensional Random Fields.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 May 91,

JUL 91 149P

PERSONAL AUTHORS: Yagle, Andrew E.

CONTRACT NO. AFOSR-89-0017

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, XF
91-0741, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report develops fast algorithms for computing filters for linear least squares estimation of one, two, and three dimensional random fields. The algorithms generalize the split Levinson and Schur algorithms to two and three dimensions; however, they are applicable to a more general Toeplitz plus Hankel structure in the covariance function. A discrete version of the Bellman Siegert Krein resolvent identity is developed for smoothing problems in one and two dimensions. Applications to linear predictive coding, and restoration and smoothing, of isotropic random fields on a polar raster are demonstrated. In addition, two new algorithms are developed for spectral estimation on a two-dimensional polar raster. Both use the Radon transform to map the two dimensional problem into one dimensional problems. Interpolating functions for computing the Radon transform, positive definite covariance extensions, and correlation matching are all considered.

DESCRIPTORS: (U) , ALGORITHMS, CODING, CORRELATION, COVARIANCE, ESTIMATES, FUNCTIONS(MATHEMATICS), ISOTROPISM, LEAST SQUARES METHOD, LINEAR ALGEBRA, LINEAR SYSTEMS, MAPS, MATCHING, MULTIPURPOSE, ONE DIMENSIONAL, POLAR REGIONS, PREDICTIONS, RASTERS, SPECTRA, THREE DIMENSIONAL, TWO DIMENSIONAL.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 249 CONTINUED

IDENTIFIERS: (U) WUAFOSR2304A8, PE61102F, *Mathematical filters, *Algorithms, *Estimates, *Least squares method.

AD-A240 222 6/5

MONTANA STATE UNIV BOZEMAN DEPT OF CHEMISTRY

(U) Development of Methods for Detection of Lipid Peroxidation Products in Human Tissues Generated by Environmental Toxins.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 90-30 Jun 91,

JUL 91 4P

PERSONAL AUTHORS: Van Kuijk, Frederik J.

CONTRACT NO. AFOSR-90-0327

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0753, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have almost completed the organic synthesis of stable isotope internal standards of aldehydic products of lipid peroxidation. We have used human retina tissues as a model, since it contains high levels of poy-unsaturated fally acids and proteins with many sulfhydryl groups (rhodopsin and ATP-ases). This model will allow us to test the improved GC-MS methods, and perform experiments for binding and release of aldehydes to proteins. our studies of lipid peroxidation and photochemistry in the human retina are of interest to the Air force, since pilots can be exposed to high levels of ultraviolet (UV) radiation during flight missions.

DESCRIPTORS: (U) , ACIDS, AIR FORCE, ALDEHYDES, DETECTION, ENVIRONMENTS, FLIGHT, HUMANS, INTERNAL, ISOTOPES, LIPIDS, MISSIONS, ORGANIC MATERIALS, OXIDATION, PHOTOCHEMICAL REACTIONS, PILOTS, PROTEINS, RETINA, STABILITY, STANDARDS, SYNTHESIS, TISSUES(BIOLOGY), TOXINS AND ANTITOXINS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 221 1/4 1/3.12

HONEYWELL SYSTEMS AND RESEARCH CENTER MINNEAPOLIS MN

(U) New Methods in Robust Control.

DESCRIPTIVE NOTE: Final draft technical rept. Mar 88-Aug 91,

AUG 91 88P

PERSONAL AUTHORS: Doyle, John; Morton, Blaise; Elgersma, Mike

REPORT NO. HSRC-C910684

CONTRACT NO. F49620-88-C-0077

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0740, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes advances in robust control in three areas: Optimal H infinity control singular values, and dynamic inversion. The H infinity results are a thorough treatment of the theory as it has been developed over the last three years. The structured singular value section describes an application of the technique to represent inertia parametric variations in the Space Station. The dynamic inversion section addresses global stability of aircraft pitch axis dynamics using a dynamic inversion control approach. This document is the first draft of the final report for the program New Methods in Robust Control. The emphasis of this program was to develop mathematical theory to help control system designers faced with challenging control problems associated with advanced aerospace vehicles. Relevant applications include flight control systems for new Air force fighter/bomber aircraft, the F-18 HARV research vehicle, the NASP vehicle, the next generation launch system (ALS or NLS), and the Space Station.

DESCRIPTORS: (U) , AEROSPACE CRAFT, AIRCRAFT, AXES, CONTROL, CONTROL SYSTEMS, DYNAMICS, FLIGHT CONTROL SYSTEMS, GLOBAL, INERTIA, INVERSION, LAUNCHING,

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MATHEMATICS, PARAMETERS, PITCH(INCLINATION), SPACE STATIONS, STABILITY, THEORY, VALUE, VARIATIONS, VEHICLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, *Flight control systems, *Aerospace craft, *Systems craft, *Systems engineering, *Aerodynamic stability.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 209 20/5

ARKANSAS UNIV AT PINE BLUFF SPACE AND ENVIRONMENT STUDIES LAB

(U) Global Peak Flux Profile of Proton Precipitation in the Equatorial Zone.

DESCRIPTIVE NOTE: Rept. for 1 Jul 89-30 Jun 91,

APR 91 9P

PERSONAL AUTHORS: Miah, M. A.

REPORT NO. SGCSL-UAPB-02-91

CONTRACT NO. F49620-89-C-0071

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0709, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Indian Jnl. of Radio and Space Physics, v20 p127-134, Apr 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Particle precipitation near the equator within was investigated by the Phoenix-1 instrumentation on board the S81-1 mission. The monitor telescope on board the mission was sensitive to protons in the energy range 0.6 - 9.1 MeV, to alpha particles in the energy range 0.4 - 80 MeV/nucleon. The peak efficiency of the telescope was for particles 88 degrees pitch angles at the geomagnetically quiet time equatorial particle data from the global data coverage and subsequent analysis shows that the ML detector on board the mission detected mostly protons. The proton peak flux profile follows the line of minimum magnetic field. The full width at half maximum (FWHM) of the equatorial zone is well within the EUV emission zone.

DESCRIPTORS: (U) , ALPHA PARTICLES, DETECTORS, EFFICIENCY, EMISSION, EQUATORIAL REGIONS, FLUX(RATE), GLOBAL, MAGNETIC FIELDS, PARTICLES, PEAK VALUES, PRECIPITATION, PROFILES, PROTONS, SENSITIVITY, TELESCOPES,

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WIDTH.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2, *Particle precipitation, Telescope efficiency, Pitch angle, *Minimum magnetic field, Magnetically quiet time, Full width at half maximum, SAA Region, EUV Emission zone, Ring current.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 208 20/5

ARKANSAS UNIV AT PINE BLUFF SPACE AND ENVIRONMENT STUDIES LAB

(U) The ONR-602 Experiment and Investigation of Particle Precipitation Near the Equator,

91 18P

PERSONAL AUTHORS: Miah, M. A.

REPORT NO. SGCSL-UAPB-03-91

CONTRACT NO. F49620-89-C-0071

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0710, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Geomag. Geoelectr., v43 p445-460 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The ONR-602 experiment on board the S81-1 US Air Force mission was used, as one of its objectives, to investigate the global precipitation of radiation belt particles at low altitude. The experiment consisted of two particle telescopes - the main telescope and the monitor telescope. The main telescope performed Pulse-Height Analysis (PHA) on a priority basis set by the triggering of specific logical combinations of detectors to determine the charge, mass and energy of events, and returned detector coincidence and single counting rates. Detector coincidence counting rates were formed by various logical combinations of the detectors, and single counting rates were simply individual detector's counting rates. The three rates were corresponding to the three discriminator thresholds - ML (0.38 MeV), MM (2.80 MeV), and MH (10.50 MeV) for the pulse height analyzer of the single Si detector.

DESCRIPTORS: (U) , AIR FORCE OPERATIONS, COINCIDENCE COUNTING, COUNTING METHODS, DETECTORS, ENERGY, EQUATORIAL REGIONS, GLOBAL, LOW ALTITUDE, MISSIONS, PARTICLES,

AD-A240 208 CONTINUED

PRECIPITATION, PULSE HEIGHT ANALYZERS, RATES, TELESCOPES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2, *Radiation belt, *Pulse-height analysis, Counting rates, Discriminator thresholds, Quasitrapped, Cosmic rays, Geomagnetic latitude, Charge exchange, Thermosphere, Exosphere.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 195 12/2

PRINCETON UNIV NJ

(U) A Systematic Approach to Combustion Model Reduction and Lumping.

DESCRIPTIVE NOTE: Final technical rept. Dec 88-Dec 90,

AUG 91 461P

PERSONAL AUTHORS: Rabitz, Herschel; Dryer, Fredrick

CONTRACT NO. AFOSR-89-0070

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0714, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes research activities completed over the past two years in the general area of combustion model reduction and lumping. The purpose of the research was for the further development of practical techniques capable of rendering complex combustion-transport models to their physical essence for realistic computational execution. The research followed three avenues of approach: (a) sensitivity analysis, (b) linear projective transformations; (c) Lie algebraic techniques. The diversity of approach was necessitated by the complexity of the problem and significant progress was made in each area. Specific conclusions were made concerning the likely next level of research developments needed to advance these tools to practical fruition.

DESCRIPTORS: (U) , ALGEBRA, COMBUSTION, COMPUTATIONS, LIE GROUPS, MODELS, REDUCTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, *Combustion modelling, Chemical kinetics, Lumping, Reduction, Sensitivity analysis, *Algebra techniques.

AD-A240 195

AD-A240 193 9/3

SRI INTERNATIONAL MENLO PARK CA

(U) Novel Nonlinear Laser Diagnostic Techniques.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 90-31 May 91,

JUN 91 35P

PERSONAL AUTHORS: Faris, Gregory W.; Jeffries, Jay B.; Huestis, D. L.

REPORT NO. SRI-MP-91-160

CONTRACT NO. F49620-90-C-0044

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0708, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes research on novel laser-based diagnostic techniques in two areas: (1) extension of laser-based diagnostics to shorter wavelengths, allowing two-photon detection of atomic ions; and (2) investigation of the feasibility of obtaining quantitative concentration and velocity measurements using amplified spontaneous emission (ASE). For the first task, we have developed a high power VUV source based on two-photon-resonant difference frequency mixing of a ArF excimer laser and a frequency-doubled Nd:YAG-pumped dye laser in krypton gas. Up to 6 micro J at 147 nm have been generated, and the characteristics of the mixing process have been studied. On the second task, we have performed the first measurement of the ASE bandwidth, indicating that temperature and velocity measurements may be possible. Measurement of ASE in a variety of flames demonstrate that the ASE signal intensity can be influenced by gas collisions.

DESCRIPTORS: (U) , AMPLIFICATION, COLLISIONS, DETECTION, DIAGNOSIS(GENERAL), DYE LASERS, EMISSION, EXCIMERS, FLAMES, GASES, HIGH POWER, INTENSITY, KRYPTON, LASER APPLICATIONS, LASER PUMPING, LASERS, MEASUREMENT, MIXING,

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NONLINEAR SYSTEMS, PHOTONS, SIGNALS, SOURCES, VACUUM ULTRAVIOLET RADIATION, VELOCITY, YAG LASERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3, LPN-SRI-1187, *Laser based diagnostics, Multiphoton excitation, Atomic ions, VUV generation, Four-wave mixing, Amplified spontaneous emission, Velocity measurement, Temperature measurement, Concentration measurements.

AD-A240 157 11/6.2

MINNESOTA UNIV MINNEAPOLIS

(U) Ultra High Vacuum Sputtering System.

DESCRIPTIVE NOTE: Final rept. 1 Dec 89-15 Jun 91,

JUL 91 8P

PERSONAL AUTHORS: Dahlberg, E. D.

CONTRACT NO. AFOSR-89-0138

PROJECT NO. 3484

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0745, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant provided for the purchase of an ultrahigh vacuum sputtering system for the preparation of high quality multilayered magnetic films and thin films. The system allows the preparation of continuous alloys with the use of three magnetron clusters and epitaxial multilayer films using ion beam sputtering. Initial tests of the quality of the films indicate that the films prepared in this system are comparable to those prepared by other workers using similar and different techniques in this area of research. The structural quality of the samples prepared with the system has been measured with low angle x-ray scattering whereas the magnetic properties have been characterized with electrical transport, magnetization, and magneto-optic measurements.

DESCRIPTORS: (U) , ALLOYS, ELECTRICAL PROPERTIES, EPITAXIAL GROWTH, FILMS, ION BEAMS, LAYERS, LOW ANGLES, MAGNETIC PROPERTIES, MAGNETIZATION, MAGNETOOPTICS, MAGNETRONS, MEASUREMENT, PREPARATION, QUALITY, SPUTTERING, STRUCTURAL PROPERTIES, THIN FILMS, TRANSPORT, ULTRAHIGH VACUUM, X RAY SCATTERING.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484A3, *Sputtering, *Magnetic films, Ultrahigh vacuum, Magnetrons, Epixtaxial growth.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 158 9/1 20/12

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Physics of Ultrasmall Superconducting Circuits.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

JUN 91 9P

PERSONAL AUTHORS: Prober, Daniel E.

CONTRACT NO. AFOSR-88-0270

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR, XF
TR-91-0746, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The collaboration between Yale and the Westinghouse Science and Technology Center produced high quality, sub-micron, superconducting Nb trilayer tunnel junctions. These junctions were made using a fabrication process developed at Westinghouse as a result of this collaboration. The junctions were fabricated on thin (2 mil) quartz substrates using the existing facilities at Westinghouse. The quality of these devices compares favorably with others reported, particularly in the sub-micron size range. These junction were used as receiving elements in a broad-band 80-120 GHz mixer receiver. This receiver had no mechanical tuning elements. The noise of this receiver using these devices is among the lowest reported in the 80-120 GHz frequency band, particularly among those with no mechanical tuning elements.

DESCRIPTORS: (U) , FABRICATION, MECHANICAL COMPONENTS, PHYSICS, QUARTZ, SIZES(DIMENSIONS), SUBSTRATES, TUNING DEVICES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C3, *Superconducting circuits, *Tunnel junctions, Mixers, Receivers.

AD-A240 155 20/12 20/10

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES ELECTRONIC SCIENCES LAB

(U) Joint Services Electronics Program Research in Electronics.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Mar 91,

MAY 91 11P

PERSONAL AUTHORS: Steier, W. H.

CONTRACT NO. F49620-88-C-0067

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0748, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During this period thirteen research projects were supported under this program in the areas of Solid State Electronics, Quantum Electronics, and Information Electronics. This three year period has been a very productive one from the scientific results achieved and the transfer of the results to industry and government laboratories. The results are documented in the scientific publications that have resulted from this research. Perhaps the best mode of technology transfer is through students who graduate and carry the technology with them to other laboratories and industry. Fifteen students received degrees while supported by JSEP during this period.

DESCRIPTORS: (U) , ELECTRONICS, INDUSTRIES, LABORATORIES, QUANTUM ELECTRONICS, SCIENTIFIC LITERATURE, SOLID STATE ELECTRONICS, STUDENTS, TECHNOLOGY TRANSFER.

IDENTIFIERS: (U) WUAFOSR2305A9, *Solid state electronics, *Quantum electronics, *Information electronics, Joint military activities.

AD-A240 154 6/5

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) RLE Progress Report No 133.

DESCRIPTIVE NOTE: Rept. for 1 Jan-31 Dec 90,

JUN 91 15P

PERSONAL AUTHORS: Durlach, Nathaniel I.

CONTRACT NO. AFOSR-90-0200

PROJECT NO. 2313

TASK NO. A9

MONITOR: AFOSR, XF
TR-90-0200, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Sensory Communication Group is conducting research on the auditory and tactual senses, speech-reception aids (both auditory and tactual) for individuals who are hearing-impaired or deaf, and human-machine interfaces for teleoperator and virtual-environment systems (involving the visual as well as the auditory and tactual senses). Within the domain of hearing aids, research is being conducted on systems that bypass the outer and middle ear and directly stimulate the auditory nerve electrically (cochlear prostheses), as well as on systems that stimulate the system acoustically. The research on taction is focused not only on speech reception for the totally deaf, but also on the ability of the human had to sense and manipulate the environment. Within the domain of human interfaces, topics of special interest concern the development of principles for mapping the human sensorimotor system into non-anthropomorphic slave mechanisms (or the equivalent in virtual space) and the ability of the human sensorimotor system to adapt to alterations of normal sensorimotor loops caused by the presence of the interface.

DESCRIPTORS: (U) , *AUDITORY NERVE*, *COCHLEA*, COMMUNICATION AND RADIO SYSTEMS, DEAFNESS, EARPHONES, EXTERNAL, HUMANS, INTERFACES, MAN MACHINE SYSTEMS, MIDDLE EAR, PROSTHETICS, RECEPTION, SENSES(PHYSIOLOGY), SPEECH,

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TELEOPERATORS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A9.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 153 5/8

WISCONSIN UNIV-MADISON

(U) Pictures and Anaphora.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jul 90-30 Jun 91,

JUL 91 26P

PERSONAL AUTHORS: Glenberg, Arthur M.; Kruley, Peter

CONTRACT NO. AFOSR-89-0387

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0707, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Pictures help people to comprehend and remember texts. The goal of this project is to begin to understand how this occurs. Section I of this report contains a summary of work on several subgoals. Section II contains the report of two experiments testing the assumption that pictures provide an external memory which can assist working memory and thereby facilitate comprehension. We predicted that the availability of a diagram would interact with the difficulty of resolving anaphor references in texts. Resolution of an anaphor distance from its antecedent (which should stress working memory) should benefit greatly from a picture, whereas resolution of an anaphor near to its antecedent should benefit less from a picture. In experiments involving both cumulative and moving window presentations of texts, picture availability and distance separating antecedent from anaphor were manipulated. Although both picture presence and ease of anaphor resolution significantly improved subjects comprehension of the material, no evidence was found for an interaction of these factors. The results are interpreted as consistent with either dual code theory or aspects of working memory management that do not involve anaphor resolution.

DESCRIPTORS: (U) *READING, *COMPREHENSION, *PICTURES, MEMORY(PSYCHOLOGY), MENTAL ABILITY, COGNITION,

AD-A240 153

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CONSTRUCTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 152 9/1

MISSOURI UNIV-ST LOUIS DEPT OF PHYSICS

(U) Quantum 1/f Noise in High Technology Applications Including Ultrasmall Structures and Devices.

DESCRIPTIVE NOTE: Annual rept. no. 2 15 Jun 90-14 Jun 91,

JUL 91 33P

PERSONAL AUTHORS: Handel, Peter H.

CONTRACT NO. AFOSR-89-0416

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-91-0742, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes progress achieved this year both in the more general formulation of our new criterion for nonlinear systems which allows us to tell right away if a chaotic system will exhibit a 1/f spectrum, and in the application and further study of the quantum 1/f effect. The general criterion was applied to a one-dimensional crystal with anharmonic interactions, predicting for the first time a 1/f phonon number spectrum in the chaotic regime at very low frequencies and always when cubic terms are dominant in the potential energy. The quantum 1/f theory was applied to a quartz resonator directly for the first time, providing both an explanation for the observed 1/f frequency fluctuations and optimization means. Our new formula for collector 1/f noise in ultrasmall BJT's was found to agree reasonably with the experiment.

DESCRIPTORS: (U) , CRYSTALS, FORMULATIONS, INTERACTIONS, NONLINEAR SYSTEMS, ONE DIMENSIONAL, OPTIMIZATION, POTENTIAL ENERGY, QUARTZ RESONATORS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1, *Quantum 1/f Noise Theory, 1/f Noise, Electronic Noise, *Semiconductor devices, Quantum 1/f effect, Bipolar transistors, Noise in ultrasmall devices, Chaos, Nonlin, Dynamics.

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AD-A240 151 7/4 11/6

GE AIRCRAFT ENGINES CINCINNATI OH

(U) Alloy Modeling and Experimental Correlation for Ductility Enhancement in Near Stoichiometric Single Crystal Nickel Aluminide.

DESCRIPTIVE NOTE: Final rept. 1 Mar 88-28 Feb 91,

JUL 91 88P

PERSONAL AUTHORS: Darolia, R.; Field, R. D.; Lahrman, D. F.; Freemen, A. J.

CONTRACT NO. F49620-88-C-0052

PROJECT NO. 2038

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0743, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research was to evaluate the applicability of theoretical approaches based on first principles to understand the ductility problem in intermetallic compounds. The predictive approach is based on all electron total energy band structure calculations. Predictions were evaluated on single crystals of nickel aluminum alloys. Calculations of anti-phase boundary (APB) energy in binary NiAl and the effects of ternary alloying additions on APB energy were performed. Experimental work on the effects of Cr and V additions, predicted by the calculations to reduce APB energy, was conducted. Studies aimed at exploiting the stress induced martensite transformation in NiAl to increase low temperature toughness were also conducted. Results from the calculations were found to be in good agreement with known stoichiometric effects on the transformation in binary alloys and suggested potentially beneficial ternary and quaternary alloying additions. The investigation of the role of Chromium in promoting slip in NiAl was continued. Experiments to more fully understand this effect were performed. Additional calculations were conducted to clarify the stress induced martensite effect. Calculations aimed at understanding the role of charge density distributions and bond

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AD-A240 151 CONTINUED

directionality in NiAl were also initiated. Work to determine the role of microalloying in promoting ductility in NiAl was initiated, through calculations of their effect on local charge distribution and experimental work to determine their effect on slip and fracture behavior.

DESCRIPTORS: (U) , ADDITION, ALLOYS, ALUMINUM ALLOYS, BINARY ALLOYS, BONDING, CHARGE DENSITY, CHROMIUM, COMPUTATIONS, CORRELATION, DIRECTIONAL, DISTRIBUTION, DUCTILITY, ELECTRONS, ENERGY BANDS, INTERMETALLIC COMPOUNDS, LOW TEMPERATURE, MARTENSITE, MODELS, NICKEL ALLOYS, OPTIMIZATION, SINGLE CRYSTALS, STOICHIOMETRY, STRESSES, TERNARY COMPOUNDS, THEORY, TOUGHNESS, TRANSFORMATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2038A1, *Nickel alloys, *Aluminum, *Intermetallic compounds, *Ductility, Single crystals, Electron energy, APB(Antiphase Boundary), Engergy bands, Phase transformations, Toughness, Crystal growth, Gas turbine rotors, Martensite.

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AD-A240 133 6/4 5/8

NEW YORK UNIV NY DEPT OF PSYCHOLOGY

(U) Visual Motion Perception.

DESCRIPTIVE NOTE: Final rept. 1 Feb 88-31 Jan 91,

AUG 91 279P

PERSONAL AUTHORS: Sperling, George

CONTRACT NO. AFOSR-88-0140

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0757, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The articles enclosed with this report describe work related to five aspects of visual information processing: (1) Continuing studies of two separate motion-computation systems in human vision and the derivation of the functional properties of each. (2) The investigation of three dimensional structure derived from two dimensional visual inputs. (3) A potent form of spatial contrast-gain-control was discovered and found to be not only frequency selective but also orientation specific. This form of local gain control may exemplify a universal form of neural normalization. (4) Studies of human pattern recognition of familiar shapes (such as letters) show that its statistical efficiency approaches an incredible 50% of the ideal detector's efficiency when the pattern is spatially bandpass filtered in a band whose wavelength is of the same order as the pattern itself. (5) Studies of real and simulated saccadic eye movements in which the same sequence of images that is produced on the retina during saccadic eye movements is artificially produced on a stationary retina.

DESCRIPTORS: (U) , CONTROL, DETECTORS, EFFICIENCY, FREQUENCY, FUNCTIONAL ANALYSIS, GAIN, HUMANS, IMAGES, INFORMATION PROCESSING, MOTION, NERVOUS SYSTEM, NORMALIZING(STATISTICS), PATTERN RECOGNITION, RETINA, SEQUENCES, STATIONARY, STATISTICAL ANALYSIS, THREE DIMENSIONAL, VISION, VISUAL PERCEPTION, VISUAL SIGNALS.

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IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5, *Visual perception, *Motion, *Information processing, Vision, Space perception, Eye movements, Saccade, Cognition, Retina, Ideal detectors, Character recognition, Texture quilts, Sign language.

AD-A240 131 20/4

KENTUCKY UNIV LEXINGTON DEPT OF MECHANICAL ENGINEERING

(U) An Additive Turbulent Decomposition of the Navier-Stokes Equations Implemented on Highly Parallel Computer Systems.

DESCRIPTIVE NOTE: Final rept.,

AUG 91 49P

PERSONAL AUTHORS: McDonough, J. M.; Hylin, E. C.; Chan, Tony F.; Chan, Matthew T.; Yang, Y.

CONTRACT NO. AFOSR-90-0271

PROJECT NO. 2707

TASK NO. A1

MONITOR: AFOSR TR-91-0733

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRepared in cooperation with California Univ.

ABSTRACT: (U) Progress is reported on a study of a new turbulence simulation technique based on unaveraged, additive decomposition of the Navier Stokes equations. The decomposition formalism provides a natural separation of the governing equations into large- and small-scale parts, with the small scale solved in local subdomains. The method thus exhibits a high degree of automatic parallelism, and in addition is well-suited for application of domain decomposition methods as part of the solution process. Results presented include validation of a 2-D version of the small-scale equations, initial studies associated with bifurcation of solutions to these equations, qualitative comparisons with data, and analysis of the additive turbulent decomposition in two dimensional, generalized coordinates.

DESCRIPTORS: (U) , ADDITIVES, COMPUTERS, DECOMPOSITION, EQUATIONS, NAVIER STOKES EQUATIONS, PARALLEL PROCESSORS, SEPARATION, SIMULATION, SOLUTIONS(GENERAL), TURBULENCE, VALIDATION.

AD-A240 131 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2707A1, *Navier-Stokes equations, *Decomposition, *Turbulence, Parallel processors.

AD-A240 121 5/8 6/15

CALIFORNIA UNIV IRVINE CENTER FOR THE NEUROBIOLOGY OF LEARNING AND MEMORY

(U) Synaptic Plasticity and Memory Formation.

DESCRIPTIVE NOTE: Annual technical rept. 15 May 90-14 May 91,

JUN 91 6P

PERSONAL AUTHORS: Lynch, Gary

CONTRACT NO. AFOSR-89-0383

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0708, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the project is to define the mechanisms responsible for inducing, expressing, and stabilizing long-term synaptic potentiation (LTP), a form of physiological plasticity that is likely to be responsible for the encoding of memory in telencephalic networks. Studies in the past year defined the cellular changes likely to be responsible for expressions. The nootropic ('cognitive enhancing') drug aniracetam prolongs the open time of post-synaptic receptors mediating fast synaptic transmission. LTP changes the effect of the drug on synaptic responses in hippocampus; manipulations that enhance responses by increasing release do not interact with the drug. By far the most plausible explanation of this result is that LTP modifies receptors. This conclusion is supported by negative results from experiments testing the hypotheses that LTP is due to changes in release, receptor number, or spine resistance.

DESCRIPTORS: (U) , CELLS, CODING, DRUGS, HIPPOCAMPUS, HYPOTHESES, LONG RANGE(TIME), MEMORY DEVICES, PHYSIOLOGY, PLASTIC PROPERTIES, RESISTANCE, RESPONSE, SENSE ORGANS, SPINAL COLUMN, STABILIZATION, SYNAPSE, TEST AND EVALUATION, TIME, TRANSMITTANCE.

AD-A240 121 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, *Memory(Psychology), Cognition, *Synapse, Learning, *Drugs, Long term potentiation, Response(Biology), Brain, Hippocampus.

AD-A240 120 6/4

YALE UNIV NEW HAVEN CT

(U) A Circuit Analysis and Computational Model of Operant Conditioning in Aplysia.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jul 90-30 Jun 91,

JUL 91 4P

PERSONAL AUTHORS: Carew, Thomas J.

REPORT NO. 598A-31-41183

CONTRACT NO. AFOSR-89-0362

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0705, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our primary objective is to carry out a cellular and computational analysis of operant conditioning of the head waving response in Aplysia. During the last twelve month period, progress has been made in four areas: (1) We have now identified the critical muscle groups and motor neurons responsible for generating the operant response (head waving); (2) We have now identified the interganglionic connections in the CNS that are necessary for coordinating headwaving movements in Aplysia; (3) We have found that the endogenous firing rate of headwaving motor neurons can be operantly conditioned in a preparation consisting only of the isolated CNS attached to the oral veil (reinforcement pathway); and (4) We have developed techniques for a network model of information processing in the CNS of Aplysia.

DESCRIPTORS: (U) , APLYSIA, CELLS, CENTRAL NERVOUS SYSTEM, CIRCUIT ANALYSIS, COMPUTATIONS, INFORMATION PROCESSING, ISOLATION, MATHEMATICAL MODELS, MODELS, MOTOR NEURONS, MUSCLES, NETWORKS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1, *Aplysia,

AD-A240 121

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 120 CONTINUED

*Neural nets, Motor neurons, Central nervous system, Conditioned response, Head waving.

AD-A240 119 6/4

YALE UNIV NEW HAVEN CT SCHOOL OF MEDICINE

(U) Cytochemical Organization of the Retino-Suprachiasmatic System.

DESCRIPTIVE NOTE: Annual rept. 15 May 90-14 May 91,

AUG 91 4P

PERSONAL AUTHORS: Pol, Van D.

CONTRACT NO. AFOSR-90-0072

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0704, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report is concerned with studies of the suprachiasmatic nucleus (SCN) and associated hypothalamic regions. This part of the brain is involved in regulation of circadian rhythms. Work included ultrastructural immunocytochemistry, intracellular electrophysiology, fluo-3 calcium imaging of SCN cells, and experimental neuroanatomy.

DESCRIPTORS: (U) , ANATOMY, BRAIN, CELLS(BIOLOGY), CIRCADIAN RHYTHMS, CONTROL, CYTOCHEMISTRY, ELECTROPHYSIOLOGY, IMMUNOLOGY, NEUROLOGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A3, *Hypothalamus, *Optic nerve, *Cytochemistry, Neurotransmitters, Circadium rhythms, Brain, Gamma amiobutyric acid, Supraoptic nucleus, Synapse.

AD-A240 118 20/12

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Preparation and Characterization of High Temperature Superconductor Film Surfaces.

DESCRIPTIVE NOTE: Annual rept. no. 1 1 Jun 90-31 May 91,

MAR 91 4P

PERSONAL AUTHORS: Prober, Daniel E.

CONTRACT NO. AFOSR-90-0306

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-91-0744, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research was conducted on deposition and characterization of high temperature superconductor films. A number of configurations for sputter deposition of films were tested, including three-source co-sputtering with the guns facing, and with the guns off-axis, from the growing film, and single composite-target sputtering. The best film properties were obtained with off-axis, single target sputtering onto a heated substrate. Films were deposited onto heated magnesium oxide substrates using simultaneous sputtering (co-sputtering) from three metal targets: yttrium, copper, and a barium copper alloy. After a significant number of depositions were carried out to optimize film composition and to maximize transition temperature, we began deposition onto substrates of strontium titanate. These substrates allowed higher transition temperatures and films with lower resistivities.

DESCRIPTORS: (U) , BARIUM, CONFIGURATIONS, COPPER, COPPER ALLOYS, DEPOSITION, ELECTRICAL RESISTANCE, FILMS, GUNS, HEAT, HIGH TEMPERATURE, MAGNESIUM OXIDES, METALS, SPUTTERING, STRONTIUM, SUBSTRATES, SUPERCONDUCTORS, SYNCHRONISM, TARGETS, TITANATES, TRANSITION TEMPERATURE, YTTRIUM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1,

AD-A240 118

AD-A240 118 CONTINUED

*Superconductivity, *Thin films, Sputtering, Deposition, Strontium titanate, Ion bombardment.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 095 6/11

ARKANSAS UNIV FOR MEDICAL SCIENCES LITTLE ROCK

(U) The Asian Toxicology Conference Tour.

DESCRIPTIVE NOTE: Final rept. 15 May 90-14 May 91,

JUL 91 5P

PERSONAL AUTHORS: Chang, Louis W.

CONTRACT NO. AFOSR-90-0219

MONITOR: AFOSR, XF
TR-91-0724, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Asian Toxicology Conference Tour sucessfully induced enthusiastic responses and active interactions between American and Asian toxicologists and health care agencies. Educational and technological transfers and opportunities were made available to those countries which need awareness and training in toxicological sciences. The American scientists gained first hand information on many of the unique toxicological problems in Asia, toxicities of oriental medicinal herbs, industrial and occupational toxicological problems and managements, etc.). Much human exposure data on various toxic chemicals were also available for clinical/experimental correlations. Thus, this project has provided mutual benefits to the American scientists, as well as to the Asian countries visited. As a result of this Asian Conference Tour, Japan, Korea, Taiwan, China, and India are now interested in the possibility of forming a Federation of Asian Toxicologists to continue such scientific exchange and interaction.

DESCRIPTORS: (U) , ASIA, AWARENESS, BENEFITS, CHEMICALS, CHINA, CLINICAL MEDICINE, CORRELATION, EXCHANGE, EXPOSURE(PHYSIOLOGY), HANDS, HUMAN BODY, INDIA, INTERACTIONS, JAPAN, KOREA, MEDICAL SERVICES, SCIENTISTS, SYMPOSIA, TAIWAN, TOXICITY, TOXICOLOGISTS, TOXICOLOGY, TRAVEL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, *Toxicology, Asia, Toxic hazards, Chemicals, Scientific organizations.

AD-A240 095

AD-A240 058 6/11

GEORGIA UNIV ATHENS DEPT OF PHARMACOLOGY AND TOXICOLOGY

(U) Validation and Application of Pharmacokinetic Models for Interspecies Extrapolations in Toxicity Risk Assessments of Volatile Organics.

DESCRIPTIVE NOTE: Final rept. 1 Jul 87-30 Apr 91,

JUL 91 264P

PERSONAL AUTHORS: Dallas, Cham E.

CONTRACT NO. AFOSR-87-0248

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0735, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Direct measurements of perchloroethylene (PER), trichloroethylene (TCE), trichloroethane (TRI) and dichloroethylene (DCE) were made in the blood and exhaled breath of rats during and following inhalation exposures. The pharmacokinetics of these four halocarbons were also investigated following oral administration. An accurate assay for measuring volatile halogenated hydrocarbons in a variety of body tissues was developed and demonstrated for PER, TCE, TRI, and tetrachloroethane (TET). The tissue concentration-time profiles and bioavailability for PER and TET were determined in liver, kidney, brain, fat, lung, heart, and muscle tissues following oral and intraarterial administrations in rats. Interspecies comparisons of the pharmacokinetics of PER and TET were made following oral and intraarterial administrations in two species: Sprague-Dawley rats and Beagle dogs. Neurobehavioral determinations were conducted in rats following inhalation exposures, single oral bolus administration, and gastric infusion of PER.

DESCRIPTORS: (U) , ACCURACY, ASSAYING, BLOOD, BRAIN, DOGS, EXTRAPOLATION, HALOGENATED HYDROCARBONS, HUMAN BODY, INFUSIONS, INGESTION(PHYSIOLOGY), LIVER, LUNG, MEASUREMENT, MODELS, ORAL INTAKE, ORGANIC MATERIALS, PHARMACOKINETICS, RATS, RISK, STOMACH, TEST AND

AD-A240 058

AD-A240 058 CONTINUED

EVALUATION, TISSUES(BIOLOGY), TOXICITY, TRICHLOROETHANES, TRICHLOROETHYLENE, VALIDATION, VOLATILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A240 057 21/2 21/5 21/8 20/4

COLORADO UNIV AT BOULDER DEPT OF MECHANICAL ENGINEERING

(U) Contractors Meeting in Propulsion Held in Boulder Colorado on June 10-14, 1991.

DESCRIPTIVE NOTE: Technical rept.,

AUG 91 283P

PERSONAL AUTHORS: Birkan, M. A.; Tishkoff, J. M.

CONTRACT NO. AFOSR-89-0541

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0713, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Abstracts are given for research in airbreathing combustion, rocket propulsion, and diagnostics in reacting media supported by the Air Force Office of Scientific Research. Major topics include: Gas turbines, Shear layer, Lasers, Fluorescence, Spectroscopy, Rocket, Engines, and Scramjets.

DESCRIPTORS: (U) , , AIR BREATHING, COMBUSTION, FLUORESCENCE, GAS TURBINES, LASERS, LAYERS, PROPULSION SYSTEMS, ROCKET PROPULSION, SHEAR PROPERTIES, SPECTROSCOPY, SUPERSONIC COMBUSTION RAMJET ENGINES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, *Combustion, Combustion stability, Flames, Supersonic combustion, *Soot, Sprays, Plasmas(Physics), *Turbulent flow, Ignition, Instability, Laser induced fluorescence, *Propellants, Plasma devices, *Symposia.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 058 20/5

ARKANSAS UNIV AT PINE BLUFF SPACE AND ENVIRONMENT STUDIES LAB

(U) Observation of Z>1 Particles Below 300 km Near the Geomagnetic Equator,

91 17P

PERSONAL AUTHORS: Miah, M. A.

REPORT NO. SGCSL-UAPB-04-91

CONTRACT NO. F49620-89-C-0071

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0711, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Geomag. Geoelectr., v43 p461-475, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Precipitation of low energy protons at low equatorial altitude has been investigated by the Phoenix-1 instrumentation on board the S81-1 mission. Results of the analysis of data received by the monitor telescope and their geophysical interpretation are presented. Seven months long observation during geomagnetic average conditions in May through early December of 1982 shows that the peak precipitation of protons occurs along the line of minimum magnetic field strength. The full width at half maximum (FWHM) is nearly 13 deg. The particle flux shows a strong altitude dependence, and below 220 km it shows double peak structures. Spectral index of the precipitation flux has been obtained from the data of previous observations. Further, peak precipitation flux in 1982 is almost three times as large as peak precipitation flux in 1989. Charge exchange mechanism favors a stronger source than AP8MAX model.

DESCRIPTORS: (U) , ALTITUDE, CHARGE TRANSFER, EQUATORIAL REGIONS, FIELD INTENSITY, FLUX(RATE), GEOMAGNETISM, INDEXES, LOW ALTITUDE, LOW ENERGY, MAGNETIC FIELDS,

AD-A240 058

AD-A240 058 CONTINUED

OBSERVATION, PARTICLE FLUX, PEAK VALUES, PRECIPITATION, PROTONS, SPECTRA, STRUCTURES, WIDTH.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2, *Proton precipitation, *Minimum magnetic field strength, Full width at half maximum, Charge exchange, AP8MAX model, Spectral index, Average geomagnetic condition, 10.7 cm radio flux.

AD-A240 058

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 050 20/4

ILLINOIS INST OF TECH CHICAGO FLUID DYNAMICS RESEARCH CENTER

(U) Management and Control of Unsteady and Turbulent Flows.

DESCRIPTIVE NOTE: Final technical rept. Oct 86-Mar 90,

JUL 91 15P

PERSONAL AUTHORS: Nagib, Hassan M.; Acharya, Mukund; Corke, Thomas C.; Reisenthel, Patrick H.; Wark, Candace C.

CONTRACT NO. F49620-86-C-0133

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0726, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Conclusions from a wide range of experiments in transitioning, turbulent, separated and unsteady flow fields include the following highlights: The simultaneous generation of controlled phase-coupled plane TS waves and oblique waves was used to investigate the development of three dimensional disturbances and mechanisms of transition in a Blasius boundary layer. From these experiments, the detuning of the fundamental/ subharmonic resonance emerges as a primary candidate for the transition process under natural conditions. Three dimensional mappings of the Reynolds-stress-producing events in turbulent boundary layers over a range of Reynolds numbers and initial conditions have demonstrated that an integral-size of these dynamical motions scales better with outer variables as compared with inner variables. While the wall or inner layer is responsible for their initial, the hierarchy of their scales in the log layer expands with Reynolds number according to this outer scaling. Real-time reactive control of a model unsteady separating flow was successfully implemented using a simple scheme for the detention of the separation.

DESCRIPTORS: (U) , BOUNDARY LAYER, CONTROL, DYNAMICS, EXTERNAL, FLOW FIELDS, HARMONICS, HIERARCHIES, INTERNAL, LAYERS, MOTION, RANGE(EXTREMES), REACTIVITIES, REAL TIME,

AD-A240 050

AD-A240 050 CONTINUED

RESONANCE, REYNOLDS NUMBER, SCALE, SCALING FACTOR, SEPARATION, SYNCHRONISM, THREE DIMENSIONAL, TRANSITIONS, TURBULENT BOUNDARY LAYER, TURBULENT FLOW, VARIABLES, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2, *Turbulent flow, *Boundary layer transistion, Flow separation, Unsteady flow, Vortices, Airfoils, Three dimensional flow, Two dimensional flow.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 049 12/4 12/1

CINCINNATI UNIV OH DEPT OF AEROSPACE ENGINEERING

(U) Approximate Evaluation of Reliability and Related Quantities via Perturbation Techniques.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 89-30 Sep 90,

DEC 90 107P

PERSONAL AUTHORS: Walker, Bruce K.; Srichander, Ramaswamy

CONTRACT NO. AFOSR-89-0488

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0716, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The evaluation of the reliability, stability, and performance of fault tolerant control systems (FTCS) is considered. New sufficient conditions for stochastic stability of FTCS with standard Markovian component failure behavior and Markovian failure detection decision behavior are derived. By specializing these results to the class of linear time-invariant (LTI) FTCS with linear state feedback control laws that are reconfigured by switching the feedback gain matrix according to the identified failure configuration, the stability results are strengthened to necessary and sufficient conditions for stochastic stability of a special type (exponential in mean square) that implies a very strong sense of stability (a.s. in probability). An approximate feedback control design technique for LTI FTCS is then proposed and demonstrated on a simple numerical case. In addition, previous results on semi-Markov analysis of FTCS reliability are used to derive a numerical method for establishing approximately optimal failure detection test thresholds for sequential failure detection tests. This method, though approximate, is shown to yield thresholds that provide a considerable increase in system reliability relative to those provided by a method based on a rigorously derived reliability approximation for one numerical example.

AD-A240 049

AD-A240 049 CONTINUED

DESCRIPTORS: (U) , CONFIGURATIONS, CONTROL SYSTEMS, DETECTION, FAILURE, FAULTS, INVARIANCE, LINEAR SYSTEMS, MARKOV PROCESSES, MEAN, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, PERTURBATIONS, RELIABILITY, SEQUENTIAL ANALYSIS, STABILITY, STATISTICAL TESTS, STOCHASTIC PROCESSES, TEST AND EVALUATION, TIME, TOLERANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, *Control systems, *Systems analysis, *Fault tolerance, *Numerical methods and procedures.

IAC NO. GC-920344

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)CONTROL SYSTEMS, CONTROL LAWS, STOCHASTIC PROCESSES, FEEDBACK CONTROL, STABILITY, RELIABILITY.;

AD-A240 049

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 048 20/4

TULANE UNIV NEW ORLEANS LA DEPT OF MATHEMATICS

(U) A Grid-Free Method for High Reynolds Number Flow Around an Immersed Elastic Structure.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 Jul 90,

JUL 90 29P

PERSONAL AUTHORS: Fauci, Lisa J.

CONTRACT NO. AFOSR-89-0295

PROJECT NO. 6177

TASK NO. 55

MONITOR: AFOSR, XF
TR-91-0730, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Finite difference schemes do not perform well in simulations of high Reynolds number flow because a restrictive number of grid points must be used to resolve boundary layers. In this report we present a grid-free numerical method which may be used to calculate flows around an immersed elastic structure. Numerical results are presented in two simple cases: flow past a circular cylinder and flow past a flat past a flat plate. Here the boundary motion is specified and is not time dependent. However, this algorithm can be used to simulate more complicated, time dependent problems in biological fluid mechanics.

DESCRIPTORS: (U) , ALGORITHMS, BIOLOGY, BOUNDARIES, BOUNDARY LAYER, ELASTIC PROPERTIES, FINITE DIFFERENCE THEORY, FLOW, FLUID MECHANICS, GRIDS(COORDINATES), HIGH RATE, MOTION, NUMERICAL ANALYSIS, PLATES, REYNOLDS NUMBER, TIME DEPENDENCE.

IDENTIFIERS: (U) PE62202F, WUAFOSR617755, Boundary layer flow, Reynolds number, Immersion, Mathematical models, Cylinders, Plates, Underwater structures, Navier Stokes equations, Velocity, Grids.

AD-A240 048

AD-A240 046 12/2

MISSOURI UNIV-COLUMBIA DEPT OF MATHEMATICS

(U) Applications of Multiparameter Bifurcations of Period Functions.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-30 Jun 91,

JUL 91 17P

PERSONAL AUTHORS: Chicone, Carmen

CONTRACT NO. AFOSR-89-0078

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0722, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the research project was a mathematical analysis of multiparameter bifurcation problems which arise in the study of ordinary differential equations, especially, the bifurcation of critical points of period functions and the bifurcation of continuous families of periodic trajectories.

DESCRIPTORS: (U) , DIFFERENTIAL EQUATIONS, MATHEMATICAL ANALYSIS, TRAJECTORIES.

IDENTIFIERS: (U) *Bifurcation(Mathematics), *Mathematical analysis, Parameters, Nonlinear systems.

AD-A240 046

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 045 24/3

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF ENVIRONMENTAL HEALTH SCIENCES

(U) International Conference on Combined Effect of Environmental Factors (4th).

DESCRIPTIVE NOTE: Final rept. 30 Sep 90-29 Mar 91,

AUG 91 4P

PERSONAL AUTHORS: Fechter, Lawrence D.

CONTRACT NO. AFOSR-90-0344

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0732, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Issues discussed during the conference included interactions between gases and particulates, health effects of combined exposure in the psychosocial work environment, health effects from combined exposure to solvents and mechanisms of oto-and vestibulo-toxicity. The material presented at the scientific sessions included both laboratory based research and epidemiological study.

DESCRIPTORS: (U) , ENVIRONMENTS, EPIDEMIOLOGY, EXPOSURE(GENERAL), GASES, HEALTH, INTERNATIONAL, LABORATORY TESTS, PARTICULATES, SOCIAL PSYCHOLOGY, SOLVENTS, SYMPOSIA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, *Enviromental impact, *Hazardous materials, Hazardous wastes, Toxic hazards.

AD-A240 045

AD-A240 044 20/14 17/9

DELAWARE UNIV NEWARK DEPT OF MATHEMATICS

(U) Optimization Methods in Control of Electromagnetic Fields.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 May 91,

MAY 91 11P

PERSONAL AUTHORS: Angell, Thomas S.; Kleinman, Ralph E.

CONTRACT NO. AFOSR-88-0269

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0719, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program is developing constructive methods for certain constrained optimization problems arising in the design and control of electromagnetic fields and in the identification of scattering objects. The problems addressed fall into three categories: (1) the design of antennas with optimal radiation characteristics measured in terms of directivity: (2) the control of the electromagnetic scattering characteristics of an object, in particular the minimization of its radar cross section, by the choice of material properties, and (3) the determination of the shape of scattering objects with various electromagnetic properties from scattered field data. The main thrust of the program is toward the development of constructive methods based on the use of complete families of solutions of the time-harmonic Maxwell equations in the infinite domain exterior to the radiating or scattering body. During the course of the work an increasing amount of attention has been devoted to the use of iterative methods for the solution of various direct and inverse problems. The continued investigation and development of these methods and their application in parameter identification has become a significant part of the program.

DESCRIPTORS: (U) , ANTENNAS, CONTROL, ELECTROMAGNETIC FIELDS, ELECTROMAGNETIC PROPERTIES, HARMONICS,

AD-A240 044

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 044 CONTINUED

IDENTIFICATION, INVERSION, MAXWELLS EQUATIONS, METHODOLOGY, OPTIMIZATION, PARAMETERS, RADAR CROSS SECTIONS, RADIATION, SCATTERING, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, *Electromagnetic scattering, *Radar targets.

IAC NO. GC-920343

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)RADAR, ANTENNAS, ANTENNA RADIATION PATTERNS, SCATTERING, OPTIMIZATION.;

AD-A240 043 20/4

YALE UNIV NEW HAVEN CT DEPT OF MECHANICAL ENGINEERING

(U) (DURIP) Two and Three Dimensional Imaging of Turbulent and Unsteady Flows.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 90,

JUL 91 3P

PERSONAL AUTHORS: Sreenivasan, K. R.

CONTRACT NO. AFOSR-89-0163

PROJECT NO. 3842

MONITOR: AFOSR, XF
TR-91-0718, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *FLOW VISUALIZATION, TURBULENT FLOW, UNSTEADY FLOW, IMAGES, INSTRUMENTATION, TWO DIMENSIONAL, THREE DIMENSIONAL, WAKE.

IDENTIFIERS: (U) PE61104D.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 042 12/3

WISCONSIN UNIV-MADISON

(U) Life Testing and Reliability with Application in Engineering Systems.

DESCRIPTIVE NOTE: Final rept. 15 Jun 87-14 Oct 90,

OCT 90 8P

PERSONAL AUTHORS: Johnson, Richard A.; Bhattacharyya, Gouri K.

CONTRACT NO. AFOSR-87-0258

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0720, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Current research is concentrated in several important areas of life testing and reliability which are theoretically challenging as well as directly motivated from potential practical applications to engineering systems. Particular emphasis was placed on the development of procedures that are appropriate for costly experiments involving small sample sizes.

DESCRIPTORS: (U) , ENGINEERING, LIFE TESTS, RELIABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, *Statistical tests, *Life tests, Engineering, Air Force research, Parametric analysis, Variables.

AD-A240 041 12/4 20/2

RUTGERS - THE STATE UNIV PISCATAWAY NJ

(U) Geometry of Energy Minimizing.

DESCRIPTIVE NOTE: Final rept. 1 Sep 87-30 Sep 90,

SEP 90 3P

PERSONAL AUTHORS: Taylor, Jean E.

CONTRACT NO. AFOSR-87-0277

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0729, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The major accomplishments of this grant are: (1) Worked out a model and a computer program for the motion of polycrystalline interface in two dimensions. (2) Organized the AMS Special Session on computing Optimal Geometries, at the annual meeting in San Francisco (jointly with Fred Almgren and Al Marden), and edited the proceedings. (3) Worked out some of the theory for motion of curves in three dimensions by crystalline curvature, and implemented some of it in a computer program.

DESCRIPTORS: (U) , COMPUTER PROGRAMS, CRYSTALS, CURVATURE, ENERGY, GEOMETRY, INTERFACES, MOTION, OPTIMIZATION, POLYCRYSTALLINE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3, *Mathematical models, *Geometry, *Polycrystalline.

AD-A240 009 7/6 7/3

SOUTHEASTERN OKLAHOMA STATE UNIV DURANT DEPT OF PHYSICAL SCIENCES

(U) NMR Characterization of Products Formed in Diazotizing Mixtures of Luminol and 3-Amino-L-Tryosine.

DESCRIPTIVE NOTE: Final rept. 15 Sep 89-14 Jul 91,

AUG 91 39P

PERSONAL AUTHORS: Wright, John R.

CONTRACT NO. AFOSR-89-0530

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0756, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A diazotized mixture of luminol and 3-amino-L-tyrosine prepared as an acetone-precipitated solid polymerizes slowly (over a period of weeks) yielding a brown, water soluble polymer which migrates electrophoretically as an anion at pH 8. Solutions of this substance in Heavy water or a mixed D20/deuterated Dimethylsulfoxide solvent present very broadened 1 Hydrogen-nmr resonances, and all attempts to chemically fragment this material into its subunit structures have been unsuccessful. The polymer, which has been named diazoluminomelanin (DALM) because of a possible relationship to the natural melanins, is of interest because its aqueous solution with alkaline Hydrogen peroxide and bicarbonate ion flashes a transient chemiluminescence on being irradiated with an intense pulse of microwave energy. Also, aqueous solutions of DALM serve as substrates for the green heme proteins. The reactions leading to DALM appear to involve chiefly 3-diazonium-L-tyrosine and the 5-diazonium derivative of luminol combined in an intimate solid matrix. This solid presents a strong esr absorption, and the polymerization may involve both homolytic and heterolytic processes. Characterization of a polymer obtained from diazotized aqueous solutions of 3-amino-L-tyrosine alone indicate a linkage based on displacement of the 3-diazonium group by

AD-A240 009

AD-A240 009 CONTINUED

the alpha-amino nitrogen atom, i.e., an aryl amine polymer which retains the structural qualities of 3-amino-L-tyrosine.

DESCRIPTORS: (U) , ABSORPTION, AMINES, ARYL RADICALS, BICARBONATES, CHEMILUMINESCENCE, DISPLACEMENT, ENERGY, FLASHES, GREEN(COLOR), HEAVY WATER, HEMOGLOBIN, HETEROGENEITY, HOMOGENEITY, HYDRAZIDES, INTENSITY, IONS, MICROWAVES, MIXTURES, POLYMERIZATION, POLYMERS, PROTEINS, PULSES, SOLUTIONS(MIXTURES), SUBSTRATES, TRANSIENTS, WATER, WATER SOLUBLE MATERIALS.

IDENTIFIERS: (U) *Polymers, *Melanin, *Amines, *Aryl radicals, *Nuclear magnetic resonance, Molecular structure, Luminol, Diazotization, Phthalazinedione/5-Amino-2-3-dihydro-1-4, Tyrosine-3-Amino-L, Diazoluminomelanin.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 007 6/4

NORTHWESTERN UNIV EVANSTON IL

(U) Program and Abstracts of the Society for Research on Biological Rhythms (2nd) Held in Jacksonville, Florida on 9-13 May 1990.

DESCRIPTIVE NOTE: Final rept. 1 May 90-30 Apr 91,

JUL 91 121P

PERSONAL AUTHORS: Turek, Fred W.

CONTRACT NO. AFOSR-90-0270

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0725, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) From May 9-13, 1990 the Society for Research on Biological Rhythms held its second meeting at Amelia Island Plantation, Florida. The Society was formed to promote the advancement of basic and applied research in all aspects of biological rhythms, to disseminate important research results concerning biological rhythms to the general public, to develop and enhance the education and training of students and researchers in the field and to foster interdisciplinary communication. This second meeting was successful in meeting the goals of the Society, particularly in the area of interdisciplinary communication. This second meeting promoted the interaction of workers in the various areas in a variety of different ways. First, there was a mixture of Symposia as well as slide and poster sessions on clinical and basic research topics. The Symposia were organized to insure that the entire frequency range of biological rhythms would be presented.

DESCRIPTORS: (U) , ABSTRACTS, BIOLOGICAL RHYTHMS, CLINICAL MEDICINE, FLORIDA, FREQUENCY, INTERACTIONS, MIXTURES, PERSONNEL, SOCIETIES, STUDENTS, SYMPOSIA, TRAINING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A3, *Biological

AD-A240 007

AD-A240 007 CONTINUED

rhythms, Circadium rhythms, Photoperiodism, Abstracts, Entrainment, Symposia, Photoreceptors, Sleep, Neurotransmitters, Diurnal variations, Scientific organizations.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 008 5/8 20/1

DUKE UNIV DURHAM NC DEPT OF PSYCHOLOGY

(U) On Categorizing Sounds.

DESCRIPTIVE NOTE: Final rept. 1 Sep 87-30 Jun 91,

AUG 91 46P

PERSONAL AUTHORS: Lockhead, Gregory R.

CONTRACT NO. AFOSR-87-0353

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF
TR-91-0731, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Context is important when people judge sounds, or attributes of sounds, or other stimuli. It is shown how judgments depend on what sounds recently occurred (sequence effects), on how those sounds differ from one another (range effects), on the distribution of those differences (set effects), on what subjects are told about the situation (task effects), and on what subjects are told about their performance (feedback effects). Each of these factors determines the overall mean and variability of response times and response choices, which are the standard measures, when people judge attribute amounts. Trial-by-trial analysis of the data show these factors also determine performance on individual trials. Moreover, these momentary data cannot be predicted from the overall data. The opposite is not true; the averaged data can be predicted from the momentary details. These results are consistent with a model having two simple assumptions: Successive sounds (not just their attributes) assimilate toward one another in memory, and judgments are based on comparisons of these remembered events. It is suggested that relations between attributes, rather than the magnitudes of the attributes themselves, are the basis for judgment.

DESCRIPTORS: (U) , FEEDBACK, JUDGEMENT(PSYCHOLOGY), RESPONSE, SEQUENCES, SOUND, STIMULI.

AD-A240 008

AD-A240 008 CONTINUED

IDENTIFIERS: (U) *Psychoacoustics, *Sound signals, Acoustic properties, Judgement(Psychology), Range(Distance), Spatial distribution, Performance(Human), Sequences, Classification, PE61102F, WUAFOSR2313A6.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 005 7/4 21/2

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) The Determination of Rate-Limiting Steps during Soot Formation.

DESCRIPTIVE NOTE: Final rept. 1 Feb 88-31 Jan 91,

AUG 91 97P

PERSONAL AUTHORS: Colket, M. B., III; Hall, r. J.; Sangiovanni, J. J.; Seery, D. J.

REPORT NO. UTRC91-21

CONTRACT NO. F49620-88-C-0051

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0736, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A detailed model for soot formation has been developed for describing soot production in laminar, premixed flames. The analysis is based on detailed chemical kinetic modeling, a simplified inception model, kinetic calculations of surface growth, and coalescing particle collisions. Several different models for surface growth are compared. Sensitivities to flame parameters and many of the assumptions were determined. The importance of inception to the amount of soot formed has been verified for several premixed flames. Comparisons have been made to several flames with varying stoichiometry, temperature, fuel type, and pressure. A mechanism for the pyrolysis of cyclopentadiene has been developed. In addition, mechanisms for the addition of acetylene to cyclopentadiene to form toluene are discussed.

DESCRIPTORS: (U) , ACETYLENE, CHEMICAL REACTIONS, COMPUTATIONS, CYCLOPENTENES, FLAMES, FUELS, GROWTH(GENERAL), KINETICS, LAMINAR FLOW, MIXING, MODELS, PARTICLE COLLISIONS, PENTADIENES, PRODUCTION, PYROLYSIS, REACTION KINETICS, SOOT, STOICHIOMETRY, SURFACES, TOLUENES.

AD-A240 005

AD-A240 005 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, *Soot, *Flames, *Aromatic hydrocarbons, Acetylene, Surface reactions, Reaction kinetics, Cyclopentadienes, Pyrolysis, Benzene, Mathematical models.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A240 004 21/3

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) Coupling between Radiation and Gas Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Feb 90-1 Feb 91,

MAY 91 75P

PERSONAL AUTHORS: Merkle, Charles L.; Micci, Michael M.

CONTRACT NO. AFOSR-89-0312

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0715, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Detailed experimental and analytic studies of microwave thermal propulsion are presented. Results are obtained for four geometric configurations: bluff-body stabilized resonant cavity plasmas; swirl-stabilized resonant cavity plasmas; free-floating plasmas in resonant cavities; and propagating, bluff-body stabilized plasmas in waveguides. Swirl stabilization proved to be less effective than bluff-body stabilization and was not modeled analytically. The experimental studies included both helium and nitrogen plasmas, while the analytic results are for helium only. In the free-floating plasmas, non-axisymmetric effects in the experimental setup led to arcing to the wall, limiting maximum power levels to about 500 W, although analysis suggests substantially higher upper power levels for this configuration. The bluff-body stabilized, resonant cavity plasmas, however, allowed power absorptions up to the maximum source power of 2.5 kW and 5 atm pressure for helium, although experiments in nitrogen were limited to lower powers. The analytic predictions agree well with the experiments in terms of plasma size, location, and response to parameters such as input power, mass flow rate, electromagnetic wave form, and pressure. The predicted coupling efficiencies and peak temperatures also agree well with measurements. Coupling efficiencies of near 100% can be obtained for the resonant cavity configurations, with somewhat lower efficiencies for the propagating plasmas.

AD-A240 004 CONTINUED

DESCRIPTORS: (U) , ABSORPTION, CAVITIES, CONFIGURATIONS, COUPLING(INTERACTION), EFFICIENCY, ELECTROMAGNETIC RADIATION, EXPERIMENTAL DATA, FLOATING BODIES, FLOW RATE, GAS DYNAMICS, GEOMETRIC FORMS, HELIUM, HIGH POWER, INPUT, LIMITATIONS, MASS FLOW, MATHEMATICAL PREDICTION, MICROWAVES, NITROGEN, PARAMETERS, PEAK VALUES, PLASMAS(PHYSICS), POWER, POWER LEVELS, POWER SUPPLIES, PROPULSION SYSTEMS, RESONANCE, RESPONSE, SIZES(DIMENSIONS), TEMPERATURE, THERMAL PROPERTIES, WAVEGUIDES.

IDENTIFIERS: (U) *Electric propulsion, *Plasmas(Physics), *Plasma devices, *Microwaves, Thrusters, Coupling(Interaction), Energy transfer, Efficiency, Microwave equipment, Resouant cavities, Microwave heating, Beamed energy, Microwave heated plasmas, Electrothermal propulsion, PE61102F, WUAFOSR2308A1.

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 994 5/8

YALE UNIV NEW HAVEN CT DEPT OF PSYCHIATRY

(U) Fear-Potentiated Startle as a Model System for Analyzing Learning and Memory.

DESCRIPTIVE NOTE: Final rept. 1 Jul 87-31 Jan 91,

JAN 91 4P

PERSONAL AUTHORS: Davis, Michael

CONTRACT NO. AFOSR-87-0336

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0749, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during this funding period has focussed on the role of a particular brain area, the amygdala, in fear conditioning, using increased acoustic startle amplitude in the presence of a stimulus previously paired with shock as a measure of fear in rats. We have found that (a) electrical stimulation of the amygdala increases startle; (b) mechanical or chemical lesions of the amygdala prevent either footshock or stimuli paired with footshock from elevating startle; (c) there is a direct anatomical connection between the central nucleus of the amygdala and a specific point along the acoustic startle pathway; (d) lesions at several levels of this connection between the amygdala and the startle circuit block conditioned and unconditioned fear; (e) local infusion of specific receptor antagonists into the amygdala prevent the development of fear conditioning and (f) presentation of a conditioned fear stimulus activates early expression genes (c-fos) in the amygdala. The data strongly implicate the amygdala as a critical brain structure for both the acquisition and expression of conditioned and unconditioned fear. Drugs that reduce anxiety in humans may act by interacting with specific receptors in the amygdala.

DESCRIPTORS: (U) , ACQUISITION, ANXIETY, BRAIN,

AD-A239 994

AD-A239 994 CONTINUED

CHEMICALS, CIRCUITS, DRUGS, ELECTRIC CURRENT, FEAR, GENES, HUMANS, INFUSIONS, LEARNING, LESIONS, MEASUREMENT, MECHANICAL PROPERTIES, MODELS, PHARMACOLOGICAL ANTAGONISTS, RATS, SENSE ORGANS, STIMULATION(GENERAL), STIMULI.

IDENTIFIERS: (U) WUAFOSR2312A2, PE61102F, *Fear, Conditioning(Learning), Memory(Psychology), *Conditioned response, *Amygdala, Ganglia, Shock(Pathology), Rats, Acoustic startle.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 822 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Identification of Nonlinear Times Series from First Order Cumulative Characteristics.

DESCRIPTIVE NOTE: Technical rept.,

AUG 91 25P

PERSONAL AUTHORS: McKeague, Ian W.; Zhang, Mei-Jie

REPORT NO. FSU-STATISTICS-TR-M-853

CONTRACT NO. DAAL03-88-G-0204, $DAA03-90-G-0103

MONITOR: ARO, ARO, AFOSR, XA
27868.10-MA, D-121, TR-91-261, ARO

UNCLASSIFIED REPORT

ABSTRACT: (U) We consider the problem of identifying the class of time series model to which a series belongs based on observation of part of the series. Techniques of nonparametric estimation have been applied to this problem by various authors using kernel estimates of the one-step lagged conditional mean and variance functions. We study cumulative versions of Tukey regressogram estimators of such functions. These are more stable than estimates of the mean and variance functions themselves and can be used to construct confidence bands. Goodness of fit tests for specific parametric models are also developed.

DESCRIPTORS: (U) , ESTIMATES, FUNCTIONS, GOODNESS OF FIT TESTS, MATHEMATICAL MODELS, MEAN, MODELS, NONLINEAR SYSTEMS, NONPARAMETRIC STATISTICS, OBSERVATION, PARAMETRIC ANALYSIS, TIME SERIES ANALYSIS, VARIATIONS.

IDENTIFIERS: (U) *Time series analysis, *Mathematical models, *Nonlinear analysis.

AD-A239 445 6/4

VISION SCIENCES RESEARCH CORP SAN RAMON CA

(U) Suprathreshold Contrast Sensitivity Vision Test Chart.

DESCRIPTIVE NOTE: Final rept. 15 May 88-14 May 91,

JUL 91 77P

PERSONAL AUTHORS: Ginsburg, Arthur P.

CONTRACT NO. F49620-88-C-0083

MONITOR: AFOSR, XF
TR-91-0696, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research project further developed and tested the first-ever practical suprathreshold contrast test chart (SCTS). The SCTS, which measures a family of suprathreshold contrast-matching curves, was found to be a valid and reliable test chart and extends our knowledge about spatial mechanisms in normal and abnormal vision by allowing extensive data collection due to its portability, and ease and speed of administration. Comparison of normative data collected in 336 eyes with data collected on patients having amblyopia, glaucoma and macular degeneration showed that the SCTS may be effectively used as an initial screening tool and for monitoring patients in clinical situations. Individual differences in contrast-matching curves, similar to those seen in contrast sensitivity, were seen in visually normal and clinical patients. The SCTS significantly predicts letter detection and discrimination above the predictive ability of contrast sensitivity by approximately 12%.

DESCRIPTORS: (U) , ABNORMALITIES, CHARTS, CLINICAL MEDICINE, CONTRAST, DATA ACQUISITION, GLAUCOMA, MONITORING, PATIENTS, RELIABILITY, SENSITIVITY, SPATIAL DISTRIBUTION, TEST AND EVALUATION, VELOCITY, VISION.

IDENTIFIERS: (U) Vision performance, Contrast sensitivity, Target acquisition, Vision testing, Population data, Test-retest reliability, PE65502F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 340 20/9

STEVENS INST OF TECH HOBOKEN NJ DEPT OF PHYSICS AND ENGINEERING PHYSICS

(U) Universal Transition from Order to Chaos and Applications in Plasma Physics.

DESCRIPTIVE NOTE: Final rept. 1 Jan 87-31 Aug 90,

AUG 90 5P

PERSONAL AUTHORS: Schmidt, George

CONTRACT NO. AFOSR-87-0122

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0693, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have proven using renormalization theory that coupled nonlinear systems exhibit universal behavior as the strength parameter and coupling parameters are varied. This qualitative as well as quantitative universality has a wide range of applicability in particular the limits of parameter ranges where free electron lasers can produce coherent waves (no chaos in electron motion) has also been studied and the results published.

DESCRIPTORS: (U) , COHERENCE, COUPLING(INTERACTION), ELECTRONS, FREE ELECTRON LASERS, MOTION, NONLINEAR SYSTEMS, PARAMETERS, PLASMAS(PHYSICS), RANGE(EXTREMES), STRENGTH(GENERAL), WAVES.

IDENTIFIERS: (U) Plasmas(Physics), Laser pumping, PE61102F, WUAFOSR2304A4.

AD-A239 326 12/5

MICHIGAN UNIV ANN ARBOR ARTIFICIAL INTELLIGENCE LAB

(U) Object Recognition in Range Images Using CAD Databases.

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-31 Jul 90,

JUL 91 14P

PERSONAL AUTHORS: Jain, Ramesh

CONTRACT NO. AFOSR-89-0277

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-91-0880, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An aspect graph plays an important role in three dimensional object recognition. Its represents the three-dimensional shape of an object by its two dimensional qualitative views as seen from various viewpoints. To create the aspect graph of an object, the viewpoint space is partitioned into regions, each of which corresponds to qualitatively similar projections of the object. Algorithms for creating aspect graphs of polyhedral objects have been developed. We developed an algorithm to compute the aspect graph of a curved object. Our approach partitions the viewpoint space by computing boundary viewpoints from the shape descriptions of the object given in a computer aided design database. These computations are formulated from the understanding of visual events and the locations of corresponding viewpoints. We also studied new visual events for piecewise smooth objects.

DESCRIPTORS: (U) , ALGORITHMS, COMPUTATIONS, COMPUTER AIDED DESIGN, CURVATURE, DATA BASES, GRAPHS, IMAGES, RECOGNITION, SHAPE, THREE DIMENSIONAL, VISION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7, *Pattern recognition, *Graphs, *Computer vision, Shape.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 325 7/3

UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

(U) Synthesis of Novel, Substituted Polycyclic Cage Systems.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Mar 91,

JUL 91 45P

PERSONAL AUTHORS: Marchand, Alan P.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0691, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of the synthesis and chemistry of poly carbocyclic cage hydrocarbons and polynitropolycyclic compounds are described. These compounds constitute a new class of energetic materials; the former are of interest as high energy/high density fuels, and the latter have potential application as relatively insensitivity high energy explosives. As part of this program, alkene dimers were prepared via low valent titanium-promoted reductive coupling of D3-trishomocubanone and of homocubanone. The mechanism of addition of electrophiles to the carbon=carbon double bond of each of the resulting alkene dimers (i.e., meso- and d,l-trishomocubylidene-trishomocubane and homocubylidenehomocubane, respectively) was investigated. In addition, the structures of several new cage intermediates were elucidated via single crystal X-ray crystallographic methods. Finally, ring homologations of substituted pentacycloundecanediones were studied.

DESCRIPTORS: (U) , ALKENES, BONDING, CHEMISTRY, DIMERS, ENERGETIC PROPERTIES, HIGH ENERGY, HIGH EXPLOSIVES, MATERIALS, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, *Hydrocarbons, *Cyclic compounds, *Synthesis(Chemistry), Polycarbocyclic compounds, Polynitropolycyclic compounds, *Polymers, Cage compounds, Cubanes, Addition reactions, Electrophilic reactions, Nitro radicals.

AD-A239 325 CONTINUED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 323 5/8 23/2

INSTITUTE FOR THE STUDY OF HUMAN CAPABILITIES
BLOOMINGTON IN

(U) Institute for the Study of Human Capabilities: Summary Descriptions of Research for the Period June 1, 1990 through May 31, 1991.

DESCRIPTIVE NOTE: Annual technical rept.,

JUL 91 72P

PERSONAL AUTHORS: Watson, Charles S.

CONTRACT NO. AFOSR-90-0215

PROJECT NO. 3396

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0697, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A Second conference was held during this funding period, on March 20-22, 1991, again on the subject of 'Human Error.' During this funding period, one Institute-supported psychophysical testing station was used in cross-modality sensory and cognitive research by a visiting scientist, Ted Bell from UCLA. Also during this funding period, the University began rehabilitation of three buildings for use in Institute-related research. Two of these buildings are an anechoic and an echoic chamber, each with associated control rooms, that were originally constructed as part of J.P. Egan's laboratory. The third building is a residence that has been modified to serve as a multi-station testing facility for Human Factors research. One of the major goals of the Institute has been to appoint a Visiting Investigator in Human Factors to augment our basic-science oriented research staff. During winter semester 1991 (January-June) two visiting investigators, Arthur D.(Dan) Fisk of Georgia Tech and Donald L. Fisher of University of Massachusetts joined our research group. Their contributions are discussed in more detail in a later section. A search is underway for suitable candidate(s) to be appointed to the position(s) for 1992.

AD-A239 323 CONTINUED

DESCRIPTORS: (U) , BUILDINGS, CONTROL CENTERS, ERRORS, GEORGIA, HUMAN FACTORS ENGINEERING, HUMANS, MASSACHUSETTS, PERFORMANCE(HUMAN), REHABILITATION, SCIENTISTS, SYMPOSIA, UNIVERSITIES, WINTER.

IDENTIFIERS: (U) *Performance(Human), *Cognition, *Human factors engineering, PE61103F, WUAFOSR3396A4.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 297 17/9 12/1

MARTIN MARIETTA ELECTRONICS AND MISSILES GROUP ORLANDO FL MISSILE SYSTEMS

(U) Applications of Wavelets to Radar Data Processing.

DESCRIPTIVE NOTE: Final rept. 27 Aug 90-26 Apr 91,

JUL 91 113P

PERSONAL AUTHORS: Stirman, Charles

REPORT NO. OA-11606

CONTRACT NO. F49620-90-C-0050, $DARPA Order-7450

MONITOR: AFOSR, XF
TR-91-0686, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this study, the recent mathematical theory of wavelets was introduced to the engineering problems of designing radar systems, radar processors, and radar algorithms. The goal was to make radars more efficient or more effective by the use of wavelets. To understand why particular possible applications of wavelets to radars were examined, it is necessary to understand some background information on both radars and wavelets theory. (Author)

DESCRIPTORS: (U) , ALGORITHMS, DATA PROCESSING, ENGINEERING, PROCESSING EQUIPMENT, RADAR, RADAR EQUIPMENT, RADAR SIGNALS, SIGNAL PROCESSING.

IDENTIFIERS: (U) PE61101E, WUAFOSR745000, *Wavelet theory, *Radar processing, Data processing, Fourier tranforms.

IAC NO. GC-920071

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)RADAR, WAVES, SIGNAL PROCESSING, DATA PROCESSING, ALGORITHMS, MODELS, MATHEMATICAL MODELS, APPROXIMATION.;

AD-A239 292 20/4 12/1 1/3

DELAWARE UNIV NEWARK DEPT OF MATHEMATICAL SCIENCES

(U) Mathematical Problems in Transonic Flow.

DESCRIPTIVE NOTE: Final rept. 1 Dec 90-31 May 91,

JUL 91 3P

PERSONAL AUTHORS: Cook-Ioannidis, L. P.

CONTRACT NO. AFOSR-91-0113

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-91-0688

UNCLASSIFIED REPORT

ABSTRACT: (U) This research was a continuation of the PI's studies of transonic flow about two and three dimensional lifting wings. The work was carried out in close collaboration with Prof. J.D. Cole, Rensselaer Polytechnic Institute. The investigations were carried out within the framework of small disturbance theory. Flows about not-so-slender wings were investigated, chokes wind tunnel flows were analyzed, and the question of the perturbation of shock free flows was considered. In addition a minisymposium for ICIAM'91 was organized around these topics, and the contributions are to be organized as a SIAM monograph.

DESCRIPTORS: (U) , FLOW, MATHEMATICS, SHOCK, THEORY, TRANSONIC FLOW, WINGS.

IDENTIFIERS: (U) *Transonic flow, *Wings, *Applied mathematics, Lifting bodies, PE61102F, WUAFOSR2304A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 284 12/5

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF MATHEMATICS STATISTICS AND COMPUTER SC IENCE

(U) Error Correcting Codes and Related Designs.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-30 Sep 90,

SEP 90 4P

PERSONAL AUTHORS: Pless, Vera

CONTRACT NO. AFOSR-88-0237

PROJECT NO. 2304

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0683, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Professor Pless has made fundamental contributions to the theory of Reed-Muller codes. In particular, she has enumerated the binary self-dual Reed-Muller codes.

DESCRIPTORS: (U) , ERROR CORRECTION CODES.

IDENTIFIERS: (U) *Error correction codes, *Bibliographies.

AD-A239 284

AD-A239 267 7/3 7/2 7/1

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Highly Fluorinated Nitrogen-Containing Compounds. New Stable Fluids.

DESCRIPTIVE NOTE: Final rept. 1 Dec 86-30 Nov 90,

JUL 91 26P

PERSONAL AUTHORS: Shreeve, Jean ne M.

CONTRACT NO. AFOSR-87-0087

MONITOR: AFOSR, XF
TR-91-0701, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main objective of this work was to synthesize highly fluorinated nitrogen-containing compounds that could be useful either as high energy materials or as fluids with good thermal and hydrolytic stabilities. Additionally, a wide range of fluoroalkylsulfonic and fluoroalkylphosphonic esters, ethers, and acids were prepared. Two new, mild nondestructive fluorinating reagents, carbonyl fluoride and trifluoroamine oxide were studied. Results of particular significance include the following: The syntheses of a large family of poly- and perfluoroalkylsulfonic, disulfonic, and sulfonic/phosphonic acids and their precursors as well as acyclic and cyclic unsaturated phosphonic acids were successfully carried out. Carbonyl fluoride is a highly versatile reagent for introducing fluorine to the central atom by the displacement of hydrogen by fluorine from P-H, N-H or C-H bonds. Inorganic oxides selected from group 5 to group 17 can be fluorinated but not invariably to the highest oxidation state. Trifluoroamine oxide converts metals to their fluorides in high purity.

DESCRIPTORS: (U) , ACIDS, ATOMS, CHEMICAL AGENTS, DISPLACEMENT, ESTERS, ETHERS, FLUIDS, FLUORIDES, FLUORINATION, HIGH ENERGY, HIGH RATE, HYDROGEN, HYDROLYSIS, INORGANIC MATERIALS, MATERIALS, METALS, NITROGEN COMPOUNDS, OXIDATION, OXIDES, PHOSPHONIC ACIDS, PURITY, RANGE(EXTREMES), STABILITY, SULFONIC ACIDS, THERMAL STABILITY.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 267 CONTINUED

IDENTIFIERS: (U) *Nitrogen compounds, *Fluorine compounds, *Organic compounds, Alkyl radicals, Phosphonic acids, Sulfonic acids, Flouroamines, PE61102F.

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AD-A239 268 20/4

STANFORD UNIV CA THERMOSCIENCES DIV

(U) Investigation of the Turbulence Producing Structures in the Boundary Layer.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 Jan 91,

JUL 91 58P

PERSONAL AUTHORS: Kline, Stephen J.

CONTRACT NO. AFOSR-87-0304

PROJECT NO. 2703

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0692, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Phase A: Community-wide survey of existing knowledge on turbulence producing structures in the boundary layer. Creation of a uniform nomenclature for the field. Phase B: Study of questions focused by Phase A using a work station to interrogate the Direct Navier-Stokes Simulation Data Base for the Flat Plate, at R-theta = 670. Results include: (1) creation of the first clear picture of the spatio-temporal relations among the eight kinds of structure previously documented and their connections to regions of high and low pressure at the wall and in the flow; (2) demonstration of the centrality of two types of vortices to the turbulence producing structures in the boundary layer; tilted streamwise vortices in the wall layers and transverse vortices in the outer layer, and the range of overlap of the dense range of the distribution of the two vortex types is the log region; (3) establishment of two computer methods for identification of vortices (as distinct from lines of vorticity); documentation of sizes, circulations and distributions of vortices for preliminary sample. This work establishes a basis for considering connections between knowledge of the physics and computer models of turbulence in the next phases of research.

DESCRIPTORS: (U) , BOUNDARY LAYER, COMPUTER APPLICATIONS, COMPUTERIZED SIMULATION, DISTRIBUTION, EXTERNAL, HIGH

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AD-A239 266 CONTINUED

DENSITY, IDENTIFICATION, LAYERS, LOW PRESSURE, OVERLAP, PLATES, SIZES(DIMENSIONS), TILT, TRANSVERSE, TURBULENCE, VORTICES, WALLS, WORK STATIONS.

IDENTIFIERS: (U) *Turbulent boundary layer, *Turbulence, Computerized simulation, PE61102F, WUAFOSR2703A2.

AD-A239 265 17/5.1 20/12

STANFORD UNIV CA DEPT OF APPLIED PHYSICS

(U) Detectors of Infrared Radiation Based on High T(c) Superconducting YBCO Films.

DESCRIPTIVE NOTE: Final rept. 1 Dec 87-30 Apr 90,

JUN 91 6P

PERSONAL AUTHORS: Geballe, Theodore H.

CONTRACT NO. F49620-88-K-0002

MONITOR: AFOSR, XF
TR-91-0695, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) , DETECTORS, INFRARED RADIATION.

IDENTIFIERS: (U) TPR(Transient Photoresponse), Infrared detectors, Light pulses.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 264 12/1

OHIO STATE UNIV COLUMBUS DEPT OF MATHEMATICS

(U) Coherence and Chaos in Integrable PDEs (Partial Differential Equations).

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-30 Sep 90,

MAR 91 52P

PERSONAL AUTHORS: Overman, Edward

CONTRACT NO. AFOSR-88-0195

PROJECT NO. 2304

TASK NO. K7

MONITOR: AFOSR, XF
TR-91-0694, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of the efforts for grant AFOSR-88-0195 are: (1) numerically identified low dimensional chaotic attractors with spatially coherent structures; (2) measured the properties of the chaos; (3) identified the sources and types of chaos; (4) determined natural coordinates for the attractor which are associated with the simple spatial patterns in chaos; AND (5) used these coordinates to calculate reduced systems of equations which have the same routes to chaos and qualitatively-and quatitatively-similar strange attractors.

DESCRIPTORS: (U) , COHERENCE, COORDINATES, EQUATIONS, PATTERNS, REDUCTION, SPATIAL DISTRIBUTION, STRUCTURES.

IDENTIFIERS: (U) *Partial differential equations, PE61102F, WUAFOSR2304K7.

AD-A239 264

AD-A239 263 6/1 6/11

CREIGHTON UNIV HEALTH SCIENCES CENTER OMAHA NE

(U) Production of Reactive Oxygen Species by Polyhalogenated Cyclic Hydrocarbons (PCH).

DESCRIPTIVE NOTE: Annual rept. 15 Jun 90-14 Jul 91,

JUL 91 25P

PERSONAL AUTHORS: Stohs, Sidney J.

CONTRACT NO. AFOSR-90-0278

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0678, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have developed a HPLC method for the simultaneous determination of four lipid peroxidation products, namely, formaldehyde, malondialdehyde, acetaldehyde and acetone. This procedure has wide-spread applicability to exposure to environmental pollutants as well as the study of various disease states. Initial studies have clearly demonstrated that the in vitro exposure of peritoneal macrophages, mitochondria and microsomes to selected PCH results in the production of reactive oxygen species as well as a decrease in membrane fluidity. Furthermore, the administration of a variety of polyhalogented cyclic hydrocarbons to rats results in an induction of DNA damage as assessed by the formation of DNA single strand breaks. The results support our basic hypothesis concerning the ability of polyhalogenated cyclic hydrocarbons to induce production of reactive oxygen species which may lead to membrane damage and the subsequent manifestation of toxic symptoms following exposures.

DESCRIPTORS: (U) , ACETALDEHYDE, ACETONES, CYCLES, DAMAGE, DEOXYRIBONUCLEIC ACIDS, DETERMINATION, ENVIRONMENTS, EXPOSURE(GENERAL), FLUIDS, FORMALDEHYDE, HYDROCARBONS, HYPOTHESES, IN VITRO ANALYSIS, INDUCTION SYSTEMS, LIPIDS, MACROPHAGES, MEMBRANES, MICROSOMES, MITOCHONDRIA, OXIDATION, OXYGEN, PERITONEUM, POLLUTANTS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 263 CONTINUED

PRODUCTION, RATS, REACTIVITIES, SYNCHRONISM.

IDENTIFIERS: (U) *Halogenated hydrocarbons, Urinalysis, PCH(Polybalogenated Cyclic Hydrocarbons), *Oxygen, Reactive gases, *Lipid metabolism, Membranes(Biology), Rats, *Toxicity, Excretion, Peroxidation, Liquid chromatography, PE61102F, WUAFOSR2312A5.

AD-A239 263

AD-A239 228 12/5

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Parallellogic Programming and Parallel System Software and Hardware.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Dec 90,

DEC 90 17P

PERSONAL AUTHORS: Minker,

CONTRACT NO. AFOSR-90-0027

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-91-0689, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This constitutes the final report of work performed under AFOSR grant number 90-0027 to investigate parallel problem solving and deductive databases. Under the grant experiments were performed on the PRISM parallel inference system on the BBN Butterfly. The experiments evaluated alternative message passing strategies for distributing tasks to processors at run-time. Several enhancements were made to PRISM during the grant period. These are: a new inference engine was implemented which provides more efficient support for the full control language of PRISM; and a stack based inference engine was implemented which provides efficient support for the use of limited set of control strategies. Simulation studies were performed which evaluate alternative methods for scheduling tasks on parallel architectures. Two methods were examined which allow thek OR-parallel execution of logic programs with no communication overhead. A study was performed evaluating two alternative methods for incorporating integrity constraints into query processing in PRISM. In the first method, separate constraint processors are introduced which check constraints at run-time. In the second method, constraints are incorporated through compile-time transformations. The study indicates that constraints are useful inquiry processing and that the compile-time methodology results in more efficient performance than

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 228 CONTINUED

checking constraints at run-time. In addition to the above, work continued in the area of informative answers to queries in deductive databases.

DESCRIPTORS: (U) , ARCHITECTURE, COMPUTER LOGIC, COMPUTER PROGRAMS, CONTROL, DATA BASES, EFFICIENCY, INTERROGATION, LANGUAGE, PARALLEL ORIENTATION, PROBLEM SOLVING, REPORTS, SIMULATION, STRATEGY.

IDENTIFIERS: (U) *Computer programming, *Parallel processing, WUAFOSR2304A7, PE61102F.

AD-A239 222 12/1

STANFORD UNIV CA DEPT OF MATHEMATICS

(U) Mathematical Problems of Nonlinear Wave Propagation and of Waves in Heterogeneous Media.

DESCRIPTIVE NOTE: Final rept. 1 Nov 87-31 Oct 90,

OCT 90 2P

PERSONAL AUTHORS: Keller, Joseph

CONTRACT NO. AFOSR-88-0053

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0687, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In Exact non-reflecting boundary conditions by Keller and Givoli, an exact boundary condition is devised for the numerical solution of the reduced wave equation in an infinite domain, using the finite element region without error. This work has been extended to other equations, including those for elastic waves, and small test problems have shown that method is very effective.

DESCRIPTORS: (U) , BOUNDARIES, ELASTIC WAVES, EQUATIONS, FINITE ELEMENT ANALYSIS, HETEROGENEITY, MATHEMATICS, MEDIA, NONLINEAR PROPAGATION ANALYSIS, NONREFLECTING COATINGS, NUMERICAL ANALYSIS, REDUCTION, REGIONS, SOLUTIONS(GENERAL), TEST AND EVALUATION, WAVE EQUATIONS, WAVE PROPAGATION.

IDENTIFIERS: (U) *Wave equations, *Problem solving, Wave propagation, PE61102F, WUAFOSR2304A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 221 7/2 11/6.1

GEORGIA INST OF TECH ATLANTA SCHOOL OF MATERIALS ENGINEERING

(U) Deformation, Constitutive Behavior and Damage of Advanced Structural Materials under Multiaxial Loading.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 90-31 May 91,

JUN 91 27P

PERSONAL AUTHORS: Antolovich, Stephen D.; Webb, Graham

CONTRACT NO. AFOSR-90-0162

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0699, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report investigates the mechanisms of cyclic and monotonic deformation in nickel aluminides (Ni3Al) and nickel/aluminum as a function of loading mode (uniaxial vs. multiaxial) temperature, strain rate and environment. The program has analytical, numerical, and experimental aspects. The premise of the program is that it is important to understand these phenomena if ordered alloys are to be used in advanced jet engine components. Ordered intermetallic alloys possessing long range atomic order and forming superlattice structures are being studied for high temperature applications which are currently dominated by superalloys. These alloys generally exhibit excellent corrosion resistance and oxidation resistance at elevated temperatures. The long range order causes slower diffusion rates and thus improves creep resistance. In these structures, dislocation motion depends on various factors which either enhance or inhibit dislocation mobility depending upon temperature. The strength of these materials does not decrease drastically with temperature as seen in other disordered alloys, and in some cases the yield stress actually increases with temperature. Inspite of the desirable properties possessed by these materials, inherent brittleness has limited their applications. This brittleness is due to weak grain boundaries for NiAl and

Ni3Al and limited number of permissible slip systems for NiAl.

DESCRIPTORS: (U) , ALLOYS, ALUMINIDES, ALUMINUM, BRITTLENESS, CONSTRUCTION MATERIALS, CORROSION RESISTANCE, CREEP STRENGTH, CRYSTAL LATTICES, DEFORMATION, DIFFUSION, DISLOCATIONS, GRAIN BOUNDARIES, HIGH TEMPERATURE, JET AIRCRAFT, JET ENGINES, LONG RANGE(DISTANCE), LONG RANGE(TIME), LOW STRENGTH, MOBILITY, MOTION, NICKEL, ORDER DISORDER TRANSFORMATIONS, OXIDATION RESISTANCE, RATES, STRAIN RATE, STRESSES, STRUCTURES, SUPERALLOYS, YIELD.

IDENTIFIERS: (U) *Intermetallic compounds, *Deformation, Axial loads, Dislocations, *Nickel aluminides, *Nickel alloys, Jet engines, Advanced materials, Yield strength, Aluminum intermetallics, Multiaxial loading, Nickel intermetallics, Mathematical models, PE61102F, WUAFOSR2306A1.

AD-A239 220 12/3

PRINCETON UNIV NJ

(U) Probability and Statistics Applied to the Theory of Algorithms.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-30 Oct 90,

OCT 90 5P

PERSONAL AUTHORS: Steele, J. M.

CONTRACT NO. AFOSR-89-0301

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0681, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report outlines in three sections the progress that has been made in the last two years. Work on the minimal spanning tree problem is first discussed, since this area has seen the most striking progress. The second section discuss work on the convex hulls of random walks. This work is the most recent, and it illustrates the broader applicability of ideas that were developed in the earlier stages of this grant. The third section discusses the thesis work of doctoral candidates Maki Monna and Jun Gao who have been supported in part through this contract.

DESCRIPTORS: (U) , ALGORITHMS, CONVEX BODIES, HULLS(STRUCTURES), TREES.

IDENTIFIERS: (U) *Probability, *Statistics, *Algorithms, Applied mathematics, PE61102F, WUAFOSR2304A5.

AD-A239 219 5/7

NORTHWESTERN UNIV EVANSTON IL

(U) Reading: Interactions with Memory.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 90-28 Feb 91,

JUL 91 56P

PERSONAL AUTHORS: McKoon, Gail

CONTRACT NO. AFOSR-90-0246

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0700, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research proposed that the representation of linguistic and contextual information be kept in working memory during reading or listening can be described as a discourse model, representing the concepts referenced in the discourse and the relations among them. The concepts in the model are hypothesized to vary in their accessibility, where accessibility is determined by the syntactic and pragmatic contexts in which the concept are introduced. Subsequent reference to a concept is a function of the interaction of the expression used to reference the concept and the concept itself. The experiments in this report demonstrate support for the discourse model view by showing that difficulty of comprehension for pronouns and the degree to which they are fully understood depends on syntactic and pragmatic variables that affect the accessibility of the pronouns' intended referents.

DESCRIPTORS: (U) , ACCESS, COMPREHENSION, INTERACTIONS, MEMORY DEVICES.

IDENTIFIERS: (U) *Linguistics, *Memory(Psychology), Retention(Psychology), PE61102F, WUAFOSR2313A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 196 12/9 9/1

PITTSBURGH UNIV PA DEPT OF ELECTRICAL ENGINEERING

(U) Wavelet Transforms and Parallel Image Processing.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 90-30 May 91,

JUN 91 33P

PERSONAL AUTHORS: Li, Ching-Chung; Hall, Richard W.; Goekmen, M.

REPORT NO. TR-SP-01-05

CONTRACT NO. AFOSR-90-0310

PROJECT NO. 9806

TASK NO. 00

MONITOR: AFOSR, XF
TR-91-0679, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A wavelet function generated by a specially constructed symmetric scale function has been explored for use in edge detection. Experiments showed that relatively refined edge information was obtained in the coarse resolution levels. An edge detection algorithm based on regularization with space-varying parameters has been developed, where the values of the parameters are adaptively determined iteratively. A multiscale edge detection algorithm using a first order regularization filter has been developed. It is demonstrated experimentally that the high localization performance of the filter is combined with high detection performance by using a multiscale integration scheme. Time performances have been evaluated for different embeddings of the wavelet coefficients into two dimensional meshes over typical wavelet based algorithms. Parallel image processing algorithms are under study to identify fundamental parallel limits and to enable fully their parallel application in multiresolution application. Novel graph compounds which can be utilized to enhance communication bandwidth in mesh architectures have been evaluated and appear to offer some promise in image processing.

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DESCRIPTORS: (U) , ALGORITHMS, BANDWIDTH, COMMUNICATION AND RADIO SYSTEMS, DETECTION, EDGES, FILTERS, FUNCTIONS, GRAPHS, IMAGE PROCESSING, LIMITATIONS, MESH, PARALLEL ORIENTATION, PARALLEL PROCESSING, RESOLUTION, SCALE, SYMMETRY, TWO DIMENSIONAL.

IDENTIFIERS: (U) *Waves, *Edges, *Image processing, *Parallel processing, Computer architecture.

IAC NO. GC-911003

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)IMAGE PROCESSING, EDGE DETECTION, EDGES, RESOLUTION, STERATION, TRANSFORMATIONS, PARALLEL PROCESSING, ALGORITHMS.;

AD-A239 196

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 175 12/9

CALIFORNIA UNIV LOS ANGELES DEPT OF MECHANICAL AEROSPACE AND NUCLEAR ENGINEER ING

(U) Digital Control and Identification of Distributed Systems.

DESCRIPTIVE NOTE: Final rept. 15 Aug 87-14 Aug 90,

AUG 90 111P

PERSONAL AUTHORS: Gibson, J. S.

CONTRACT NO. AFOSR-87-0373

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0690, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research has been conducted in the following general areas; Optimal Control of Distributed Parameter System, Adaptive Identification and Control, and Robust Control. Work includes research in approximation theory and numerical methods for the design of finite dimensional compensators for optimal control of systems represented by partial differential equations, and adaptive control and tracking problems for flexible structures and manipulators with flexible links and joints. (Author)

DESCRIPTORS: (U) , ADAPTIVE CONTROL SYSTEMS, ADAPTIVE SYSTEMS, APPROXIMATION(MATHEMATICS), COMPENSATORS, CONTROL, DIGITAL SYSTEMS, DISTRIBUTION, FLEXIBLE STRUCTURES, IDENTIFICATION, IDENTIFICATION SYSTEMS, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, SIZES(DIMENSIONS), THEORY, TRACKING.

IDENTIFIERS: (U) *Distributed parameter systems, *Digital control systems, Robust control systems, Adaptive control systems, WUAFOSR2304A1, PE61102F.

AD-A239 174 20/4

OHIO STATE UNIV COLUMBUS DEPT OF MATHEMATICS

(U) Modeling of Free Visoelastic Jets and Instability Mechanisms.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Dec 90,

DEC 90 7P

PERSONAL AUTHORS: Forest, Greg; Bechtel, Stephen

CONTRACT NO. AFOSR-88-0184

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0684, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *JET FLOW, *NONNEWTONIAN FLUIDS, DIGITAL SIMULATION, BOUNDARY VALUE PROBLEMS, ASYMPTOTIC SERIES, RHEOLOGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4, Maxwell models.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 163 12/1

NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIV GREENSBORO

(U) Numerical and Analytical Studies of Stefan Problems.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-30 Jun 91,

JUN 91 110P

PERSONAL AUTHORS: Rose, Milton E.; Borah, Bolindra N.; White, Robert E.; Kyrillidis, Archimedes J.

CONTRACT NO. F49620-89-C-0010

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0685, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with North Carolina State Univ. at Raleigh.

ABSTRACT: (U) Compact finite element scheme is used to solve Stefan Problem, with one dimensional and two dimensional numerically, using an Enthalpy formation. The numerical results indicate that the position of the melting front can be determined with first order accuracy by this method, the number of iterations at each time step being determined largely by the number of cells traversed by the front during a time step. The codes both 1-D and 2-D Stefan problems are written in Cray Fortran and vectorization on the Cray Y-MP was used. The enthalpy formulation of the 1-D and 2-D Stefan problems are approximated by compact schemes. The numerical results are compared to known exponential solutions, and the solutions and errors are plotted using mathematica. Four papers have been published or completed for publication. Three faculty members, Bolindra N. Borah (P.I.), Robert E. White (Co-P.I.), and Milton E. Rose (Co-P.I.) did work in this project. Besides three professors, there were three graduated students who also helped to complete the project.

DESCRIPTORS: (U) , ACCURACY, CELLS, ENTHALPY, FINITE

AD-A239 163

AD-A239 163 CONTINUED

ELEMENT ANALYSIS, FORMULATIONS, FORTRAN, INSTRUCTORS, ITERATIONS, NUMERICAL ANALYSIS, STUDENTS.

IDENTIFIERS: (U) *Finite element analysis, *Problem solving, Diffusion, Enthalpy, Multiprocessors, Finite difference theory, PE61102F, WUAFOSR2304A3.

AD-A239 163

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 162 11/4

NORTHWESTERN UNIV EVANSTON IL CENTER FOR QUALITY ENGINEERING AND FAILURE PREV ENTION

(U) Heterogeneous Characterization of Composite Materials with Progressive Damage.

DESCRIPTIVE NOTE: Final rept. 1 Feb 88-31 Jan 91,

JUN 91 40P

PERSONAL AUTHORS: Daniel, I. M.; Achenbach, J. D.; Keer, L. M.

REPORT NO. C447-3

CONTRACT NO. AFOSR-88-0124

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0682, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this investigation is to develop constitutive and failure models for composite materials based on observed damage mechanisms and damage development. Unidirectional continuous-fiber ceramic matrix composites were investigated under longitudinal and transverse loading. Failure mechanisms and their development were studied in real time under the microscope. Micromechanical analyses were conducted and stress distributions were obtained in the constituents and around matrix and interfacial cracks. The influence of the interphase region on stress strain relations and failure properties was studied. A modified shear lag analysis yielded stress strain relations to failure and relations between applied stress, matrix cracking and fiber-matrix debonding.

DESCRIPTORS: (U) , COMPOSITE MATERIALS, CRACKING(FRACTURING), CRACKS, DAMAGE, DELAY, DISTRIBUTION, FAILURE, INTERFACES, MATRIX MATERIALS, MODELS, PHASE STUDIES, REAL TIME, REGIONS, SHEAR PROPERTIES, STRESS STRAIN RELATIONS, STRESSES, TRANSVERSE.

AD-A239 162 CONTINUED

IDENTIFIERS: (U) *Composite materials, Heterogeneity, Ceramic materials, *Ceramic matrix composites, Failure(Mechanics), *Microstructure, Mechanical properties, Fiber reinforced composites, Tensile loading, Tensile properties, Debonding, PE61102F, WUAFOSR2302B2.

IAC NO. PL-055464 PL-055464

IAC DOCUMENT TYPE: PLASTC - MICROFICHE --

IAC SUBJECT TERMS: P--(U)CONSTITUTIVE RELATIONS, STRESS STRAIN, CHARACTERIZATION, FRACTURE, MICROMECHANICS, CRACK PROPAGATION, SILICON CARBIDE FIBERS, ALUMINUM SILICATE, COMPOSITES, THERMAL EXPANSION, INPLANE SHEAR, TENSILE STRENGTH, MATRIX CRACKING, DEBONDING, INTERFACE DEGRADATION, TRANSVERSE SHEAR, DAMAGE, ELASTIC MODULUS, SHEAR, ZZ UNLIMITED.;

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 157 21/2 21/5

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) Soot Particle Inception and Growth Processes in Combustion.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 90-15 Jan 91,

APR 91 42P

PERSONAL AUTHORS: Santoro, Robert J.

CONTRACT NO. AFOSR-87-0145

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0877, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The present research program is intended to provide a fundamental understanding of the processes controlling soot particle formation under conditions applicable to future gas turbine engine operation. During the current year of the effort, work has emphasized the effects of concentration and temperature on the formation of soot particles. Through a carefully structured study, the effects of adding a diluent to the fuel stream of a diffusion flame have been studied. Measurements and modelling efforts have shown that differences in the initial concentration of fuel are rapidly mitigated by diffusional processes. Consequently, local concentration variations are reduced between the initial undiluted and diluted flow cases. Furthermore, local temperature measurements indicate that even under equal adiabatic flame conditions, the local temperature in the soot forming region can differ by 40K between flames involving nitrogen or argon as the diluent. These differences in temperature are argued, based on previous work by other researchers, to be a possible source for the observed effects on soot formation. Additionally, consideration has been given to residence time effects, largely a result of delays in the onset of soot formation which reduces the effective time for soot growth.

AD-A239 157

AD-A239 157 CONTINUED

DESCRIPTORS: (U) , ADIABATIC CONDITIONS, ARGON, DELAY, DIFFUSION, DILUTION, FLAMES, FLOW, FUELS, GAS TURBINES, GROWTH(GENERAL), MEASUREMENT, NITROGEN, OPERATION, PARTICLES, REGIONS, SOOT, STREAMS, TEMPERATURE, TIME.

IDENTIFIERS: (U) *Soot, *Combustion, *Gas turbines, Diffusion flames, PE61102F, WUAFOSR2308A2.

AD-A239 157

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 137 8/10

PURDUE UNIV LAFAYETTE IN SCHOOL OF CIVIL ENGINEERING

(U) Anisotropic Behavior of Soils and Pressuremeter Tests.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 89-30 Jun 90,

JUL 90 18P

PERSONAL AUTHORS: Chameau, J. L.

CONTRACT NO. F49620-89-C-0090

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR, XF
TR-91-0670, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Several important questions related to cavity expansion and pressuremeter testing in clays are being investigated. Tests are performed in a cuboidal shear device to simulate pressuremeter stress paths and to evaluate the strain rate effects. Similarly, experiments will be conducted to evaluate effects of stress relief, relaxation and disturbance. Model pressuremeter tests will be performed in a calibration chamber to confirm the strain rate effects obtained in the cubic triaxial simulation and verify the applicability of the interpretation technique based on anisotropic model to determine the initial in-situ stress. The calibration chamber test equipment is currently being redesigned and modified to perform the model pressuremeter tests. The experimental data will be used to calibrate the anisotropic soil model developed for this study. With this model, one can predict the behavior of clay type material under any desired stress path from the results obtained under a particular stress path, such as the pressuremeter stress path.

DESCRIPTORS: (U) , ANISOTROPY, CALIBRATION, CAVITIES, CHAMBERS, CLAY, EXPANSION, EXPERIMENTAL DATA, MATERIALS, MODELS, PATHS, SOIL MODELS, SOILS, STRAIN RATE, STRESSES, TEST EQUIPMENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C1, *Soil tests,

AD-A239 137

AD-A239 137 CONTINUED

Pressure measurement, *Clay, Anisotropy, Shear properties, Triaxial stresses, Pressure gages, *Soil mechanics.

AD-A239 137

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 061 23/2 20/6

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Optical Computing Research.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-28 Feb 91.

APR 91 7P

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0858, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work completed under Grant AFOSR-88-0024 during the time period 1 October 1987 through 28 February properties of optical interconnections. Publications funded in whole or in part by the grant are also listed.

DESCRIPTORS: (U) , CIRCUIT INTERCONNECTIONS, OPTICAL CIRCUITS, OPTICAL PROCESSING, OPTICS.

IDENTIFIERS: (U) WUAFOSR230581, PE61102F, *Neural networks, *Optical interconnections, Hopfield networks, Associative memories.

AD-A239 061

AD-A239 060 20/4

CORNELL UNIV ITHACA NY

(U) Vortex Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 May 91,

JUN 91 6P

PERSONAL AUTHORS: Leibovich, Sidney

CONTRACT NO. AFOSR-89-0346

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0633, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A theoretical description of vortex breakdown incorporating the essential physical processes governing the occurrence, location, and strength of the phenomenon and suitable for design and control purposes, is under development. The strongly decelerated motions, which can have flow reversals and therefore provide a model for vortex breakdown events, found earlier in the course of this project for vortices of aerodynamic type, have been shown to be unstable to three-dimensional perturbations when the deceleration exceeds a threshold value. The nature of the instability agrees with experimental observations and supports a comprehensive theoretical framework for vortex breakdown previously outlined. New numerical algorithms useful for very large stability problems have been developed under grant sponsorship, and have been published or will be shortly submitted for publication. Several other stability and bifurcation problems for rotating pipe flows have been solved. Rotating pipe flows are the simplest known exact viscous flows bearing a qualitative resemblance to vortices with axial streaming, and serve as a convenient theoretical testbed on which to develop an understanding of vortex instability and subsequent nonlinear evolution.

DESCRIPTORS: (U) , AERODYNAMICS, ALGORITHMS, DECELERATION, DYNAMICS, EVOLUTION(GENERAL), FLOW, NONLINEAR SYSTEMS, PERTURBATIONS, PIPES, REVERSIBLE.

AD-A239 060

AD-A239 060 CONTINUED

ROTATION, STABILITY, TEST BEDS, THREE DIMENSIONAL, THRESHOLD EFFECTS, VISCOUS FLOW, VORTICES.

IDENTIFIERS: (U) *Vortices, Vortex breakdown, Pipe flow, PE61102F, WUAFOSR2307A1.

AD-A239 059 20/5 9/3

ILLINOIS INST OF TECH CHICAGO DEPT OF MECHANICAL ENGINEERING

(U) Scientific Imaging System.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 Oct 90,

JUN 91 7P

PERSONAL AUTHORS: Mazumder, Jyotirmoy

CONTRACT NO. AFOSR-89-0152

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0855, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Acquisition of all the necessary components for the scientific imaging system based on absorption and fluorescence spectroscopy for the measurement of concentration and nucleation rate during non-equilibrium synthesis by laser is almost complete. The list of equipment for the assembly of this unique diagnostic system is enclosed. Major components include a 20 W Argon-Ion laser and a Ring-Dye laser with various associated electronics. Equipment which has already been delivered and is currently working are marked. The remaining few are in the process of acquisition, awaiting the evaluation of the core laser scanning and detection system. This phased purchase will allow us to specify the remaining electronics to match the performance of core-laser scanning system. The diagnostic technique using this system will involve performing absorption and fluorescence spectroscopy on the plasma produced by a laser beam impinging upon the metallic surface. The diagnostic spectroscopy will use a tunable dye laser (Coherent 899-28) to probe a particular transition originating in the ground state of niobium and aluminum. The absorption cross-section at the wavelength of interest (5252 A (Nb) and 3961 A (Al) may be calculated using the tabulated values for the oscillator strengths of the various transitions between hyperfine levels which contribute to absorption at this wavelength.

AD-A239 059 CONTINUED

DESCRIPTORS: (U) , ABSORPTION, ACQUISITION, ALUMINUM, CORES, CROSS SECTIONS, DETECTORS, DIAGNOSIS(GENERAL), DYE LASERS, ELECTRONICS, FLUORESCENCE, GROUND STATE, IMAGES, LASER BEAMS, LASERS, METALS, NIOBIUM, NONEQUILIBRIUM FLOW, NUCLEATION, OPTICAL SCANNING, OSCILLATORS, PHASE, PROCUREMENT, RATES, SPECTROSCOPY, STRENGTH(GENERAL), SURFACES, SYNTHESIS, TABLES(DATA), TUNABLE LASERS, VALUE.

IDENTIFIERS: (U) Laser equipment, Spectroscopy, Fluorescence, Absorption spectroscopy, Laser produced plasmas, PE61102F, WUAFOSR2917A3.

AD-A239 040 12/1

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Fast Algorithms for Fixed-Order Recursive Least-Squares Parameter Estimation.

DESCRIPTIVE NOTE: Rept. for 1989-1990,

SEP 89 2P

PERSONAL AUTHORS: Slock, Dirk T. M.

CONTRACT NO. AFOSR-88-03271

PROJECT NO. 2304

TASK NO. A6 .

MONITOR: AFOSR, XF
TR-90-0986, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Recursive Least-Squares (RLS) algorithms are a family of widely-used techniques for adaptive parameter estimation and filtering. In many applications, a special structure in the estimation problem can be exhibited. This structure can be exploited to arrive at fast RLS algorithms. In this dissertation, we focus mainly on fast algorithms based on certain shift-invariance properties, and the particular filter structure considered will be a so-called tapped delay-line or transversal filter structure. Single-channel applications include high resolution spectrum estimation (AR modeling), noise cancellation, speech and biomedical signal processing. The multichannel algorithms (where each channel feeds a tapped delay-line) accommodate such applications as identification of systems described by difference equations with multiple polynomials (e.g. ARX and ARMAX models), adaptive minimum-variance control, fractionally-spaced and decision-feedback equalizers, multirate signal processing, image enhancement, and adaptive broadband beamforming.

DESCRIPTORS: (U) , ADAPTIVE SYSTEMS, ALGORITHMS, BEAM FORMING, BIOMEDICINE, BROADBAND, CANCELLATION, CHANNELS, DELAY LINES, DIFFERENCE EQUATIONS, ELECTROMAGNETIC WAVE FILTERS, ESTIMATES, FEEDING, FILTERS, HIGH RESOLUTION, IDENTIFICATION SYSTEMS, IMAGE PROCESSING, LEAST SQUARES

AD-A239 059

AD-A239 040

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 040 CONTINUED

METHOD, MULTICHANNEL, NOISE, OPTIMIZATION, PARAMETERS, POLYNOMIALS, RATES, RECURSIVE FUNCTIONS, SIGNAL PROCESSING, SPECTRA, SPEECH, TAPS, TRANSVERSE WAVES.

IDENTIFIERS: (U) *Least squares method, *Algorithms, *Recursive functions, Mathematical filters, Transverse, WUAFOSR2304A6, PE61102F.

AD-A239 020 5/2

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Air Force Office of Scientific Research Technical Report Summaries January - March 1991.

DESCRIPTIVE NOTE: Quarterly summary rept. Jan-Mar 91,

APR 91 398P

PERSONAL AUTHORS: Tyrrell, Debra L.

MONITOR: AFOSR, XF
TR-91-0673, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The AFOSR Technical Report Summaries are published quarterly of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center for that quarter. The following indexes are included: Contract, Subject, Personal author and title.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, .

IDENTIFIERS: (U) Announcement bulletins, Reports, Abstracts, Indexes.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A239 019 13/2

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

(U) Dynamic Response of Embedded Structures.

DESCRIPTIVE NOTE: Final rept. 15 Jan 89-15 Jan 91,

JUL 91 281P

PERSONAL AUTHORS: Keer, Leon M.; Shah, Surendra P.; Dancygier, Avraham N.

CONTRACT NO. AFOSR-89-0255

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-91-0674

UNCLASSIFIED REPORT

ABSTRACT: (U) Structures that have to resist impact loading are often designed to be embedded under soil backfill. The backfill attenuates the external surface load and decreases the free field stresses at the level of the structure. Physical mechanisms which are associated with the soil-structure interaction further affect the loading and response of the structure, and are important to understand for better, more efficient design of these structures. The response to an external surface impact of a structure with a reinforced concrete roof, embedded in a shallow depth of burial, was studied here. The research employed an experimental investigation of a small scale radial model and numerical analysis based on the finite element method to evaluate the mechanisms associated with the experimental results.

DESCRIPTORS: (U) , BURIED OBJECTS, DYNAMIC RESPONSE, EFFICIENCY, EMBEDDING, EXTERNAL, FINITE ELEMENT ANALYSIS, FREE FIELD, IMPACT, INTERACTIONS, LOADS(FORCES), MODELS, NUMERICAL ANALYSIS, PHYSICAL PROPERTIES, REINFORCED CONCRETE, RESPONSE, ROOFS, SHALLOW DEPTH, SOILS, STRESSES, STRUCTURES, SURFACES.

IDENTIFIERS: (U) WUAFOSR2302C1, PE61102F, *Dynamic loading, Embedded structures, Soil structure interaction.

AD-A239 019

AD-A238 977 12/1

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Fast Array Algorithms for Structured Matrices.

DESCRIPTIVE NOTE: Rept. for 1989-1990,

JUN 89 2P

PERSONAL AUTHORS: Chun, Joohwan

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, XF TR-90-0987, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Many engineering or mathematical problems require to factorize structured matrices (Toeplitz, Hankel, Vandermonde products of such matrices and their inverses, Schur complements, etc) either in explicit or in disguised form. Consequently there exist various analytic tools regarding structured matrices as well as several fast factorization algorithms. In this thesis, we show that many of these results and several significant generalizations can be obtained in a very constructive way. The genetic form is to use elementary circular and hyperbolic transformations to triangularize a certain array of numbers derived from the displacement representation of the given structured matrix; the desired results can then be read off from the resulting array. These fast array algorithms require O (mn) operations for LU and QR factorizations of m x n structured matrices, and O(mn) or even O(n log square n) operations for solving matrix equations. Also the array form suggests various alternative algorithms, depending upon the order in which the transformations are applied; these variations can have different numerical properties and lead to different implementations.

DESCRIPTORS: (U) , ALGORITHMS, ARRAYS, CIRCULAR, DISPLACEMENT, HYPERBOLAS, MATHEMATICS, NUMBERS, NUMERICAL METHODS AND PROCEDURES, TRANSFORMATIONS.

IDENTIFIERS: (U) *Matrices(Mathematics), *Algorithms, WUAFOSR2304A6, PE61102F.

AD-A238 977

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 975 12/1

AD-A238 975 CONTINUED

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

WUAFOSR2304A6, PE61102F.

(U) Fast Algorithms for Structured Matrices with Arbitrary Rank Profile.

DESCRIPTIVE NOTE: Rept. for 1989-1990,

MAY 90 2P

PERSONAL AUTHORS: Pal, Debajyoti

CONTRACT NO. AFOSR-88-0327

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-0985,AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Triangular factorization, solution to linear equations, inversion, computation of rank profile and inertia (in the Hermitian case) etc. of general n x n matrices require O(n cubed) operations. For certain structured matrices including Toeplitz and Hankel matrices the computational complexity is known to be O(n squared) or better. These structured matrices often arise in a wide variety of areas including Signal processing. Systems theory and Communications. Fast (i.e. O(n squared)) algorithms for these structured matrices have been actively studied for over twenty five years. However almost all the authors have assumed that the underlying matrices are strongly regular i.e. every principal submatrix is nonsingular. Although some fast algorithms have recently been developed for certain problems involving some of these structured matrices which may have one or more zero minors, several other problems is lacking. In this dissertation, we obtain several new results through a unified approach to the problems mentioned earlier.

DESCRIPTORS: (U) , ALGORITHMS, COMPUTATIONS, INERTIA, LINEAR ALGEBRAIC EQUATIONS, PROFILES, RANK ORDER STATISTICS, SIGNAL PROCESSING, SOLUTIONS(GENERAL), THEORY.

IDENTIFIERS: (U) *Matrices(Mathematics), *Algorithms,

AD-A238 975

AD-A238 975

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 935 11/11

WASHINGTON UNIV SEATTLE DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Microdesigning of Lightweight/High Strength Ceramic Materials.

DESCRIPTIVE NOTE: Final rept. for period ending 1 Jan 89,

JUL 89 149P

PERSONAL AUTHORS: Aksay, I. A.; Stangle, G. C.; Dabbs, D. M.; Sarikaya, M.

CONTRACT NO. AFOSR87-0114

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0610, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This interim report describes the results of research conducted under Grant No. AFOSR-87-0114, which deals primarily with the processing and characterization of complex ceramic matrix composite systems. Particular emphasis was placed on developing processing schemes for whisker-reinforced ceramic matrix composites. Additional studies are being conducted on boron carbide-aluminum ceramic/metal composites. Further, theoretical studies have been made to provide the foundation for developing a more fundamental understanding of colloidal systems.

DESCRIPTORS: (U) , COLLOIDS, PROCESSING, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, *Ceramics, Composite materials, Colloidal processing.

AD-A238 935

AD-A238 908 11/4

WEST VIRGINIA UNIV MORGANTOWN DEPT OF PHYSICS

(U) High Temperature Properties of Ceramic/Carbon Systems in a Oxidizing Environment.

DESCRIPTIVE NOTE: Final rept. 1 Jun 87-30 Sep 90,

MAY 91 13P

PERSONAL AUTHORS: Cooper, Bernard R.; Montano, Pedro A.

CONTRACT NO. AFOSR-87-0251

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0657, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the research has been to identify how deleterious effects on bonding develop that can cause deterioration of mechanical properties of carbon-based ceramics in a high temperature environment and then to learn how to design modified ceramic systems that can better withstand such conditions. To do this, we have developed a coordinated computer modeling/experimental study concentrating on fracture and ductility behavior as affected by impurities and defects, high temperatures and bonding effects at material interfaces. We made and studied a variety of metal/carbon and silicon/carbon systems both in naturally occurring crystals and in superlattices. The results obtained in the coordinated study provide valuable information on the interface stability of superlattice systems and on their mechanical and structural properties as compared to systems in naturally occurring crystalline forms.

DESCRIPTORS: (U) , BEHAVIOR, BONDING, CARBON, CERAMIC MATERIALS, COMPUTERIZED SIMULATION, CRYSTAL LATTICES, CRYSTALS, DETERIORATION, DUCTILITY, ENVIRONMENTS, HIGH TEMPERATURE, IMPURITIES, INTERFACES, MATERIALS, MECHANICAL PROPERTIES, METALS, OXIDATION, SILICON, STABILITY, STRUCTURAL PROPERTIES, SUPERLATTICES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A238 908

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 861 6/5

MASSACHUSETTS UNIV AMHERST

(U) Biological and Theoretical Studies of Adaptive Networks: The Conditioned Response.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 90-31 May 91,

JUN 91 51P

PERSONAL AUTHORS: Moore, John W.

CONTRACT NO. AFOSR-89-0391

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0644, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The following experimental projects were initiated: (a) Reexamination of the activity of neurons of cerebellar cortex during two-tone differential conditioning (Dr. Iwona Zurawska). (b) A recording study of the medial geniculate neurons during two-tone differential trace conditioning (Dr. Kevin O'Connor). (c) A recording study of pontine nucleus neurons during two-tone differential conditioning (Michael Hirl). (d) Anatomical experiments using WGA-HRP designed to clarify red nucleus innervation of the cerebellum (Marcy Rosenfield). (e) A behavioral experiment designed to assess attenuated latent inhibition by flagging , a phenomenon of potential importance for connectionist learning theories (Peter Underdown). In addition to the experimental work, my current team and I have initiated a major upgrading of experimental facilities.

DESCRIPTORS: (U) , ADAPTIVE SYSTEMS, ANATOMY, BEHAVIOR, BIOLOGY, CEREBELLUM, CONDITIONED RESPONSE, DORMANCY, INHIBITION, NERVE CELLS, NETWORKS, RECORDING SYSTEMS, RESEARCH FACILITIES, TEAMS(PERSONNEL), THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1.

AD-A238 859 21/3

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Non-Equilibrium and Radiation in MPD Plasmas.

DESCRIPTIVE NOTE: Final rept. 1 May 90-31 Jan 91,

MAY 91 23P

PERSONAL AUTHORS: Martinez-Sanchez, Manuel

CONTRACT NO. AFOSR-86-0019

PROJECT NO. 2038

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0634, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Report summarizes work on ionization non-equilibrium, and new results pertaining to inlet ionization in MPD thrusters are presented. Brief summaries are also given of our work on transport effects, Hall effects magnetic layers and electrothermal arcjets. The object of our research has been the basic physics of plasma thrusters, particularly MPD thrusters. More specifically, the present Grant, addressed the complex of issues which encompass excitation - ionization kinetics of MPD plasmas, and their effects on thruster flows.

DESCRIPTORS: (U) , FLOW, HALL EFFECT, INLETS, IONIZATION, KINETICS, LAYERS, MAGNETIC MATERIALS, NONEQUILIBRIUM FLOW, PHYSICS, PLASMA ENGINES, THRUSTERS, TRANSPORT.

IDENTIFIERS: (U) *Plasma thrusters, *Plasma ngines, PE61102F, WUAFOSR2038A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 858 21/3

STUTTGART UNIV (GERMANY F R) INST FUER RAUMFAHRTSYSTEME

(U) Basic Processes of Plasma Propulsion.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-31 Jul 90,

APR 91 88P

PERSONAL AUTHORS: Schrade, Herbert O.; Sleziona, P. C.; Kurtz, Helmut L.

CONTRACT NO. AFOSR-86-0337

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0635, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In order to improve performance, lifetime and reliability of plasma thrusters one has to understand and assess the fundamental processes and problem areas like nonequilibrium magneto plasma dynamics flows in electric discharges, their stability and electrode erosion effects. In order to assess the flow, pressure and density or temperature fields in plasma thruster devices several theoretical model calculations have been developed and applied to different thruster configurations. The results of these calculations are compared with corresponding experimental arc devices and both agree well with each other. Concerning the plasma stability work, a new explanation of the so called Onset Phenomenon is presented. It is based on a run-away Joule heating effect caused by the self magnetic field of a current carrying plasma channel which drastically decreases the radial heat conduction losses due to the electrons. The dependency of the electron heatflux vector and heat conduction coefficient in a transverse magnetic field has been derived by means of a perturbation approach of the Maxwell distribution. Cathode erosion measurements have been conducted by means of a fully automatically working test rig. The cathode sample is repeatedly charged by a fairly rectangular current pulse of 1400 A which lasts about 2 ms. Erosion rate measurements on thoriated (2% Thorium Oxide) cathode samples are reported on and explained by a refined cathode spot theory.

DESCRIPTORS: (U) , CATHODES, CHANNELS, COMPUTATIONS, CONFIGURATIONS, ELECTRIC DISCHARGES, ELECTRODES, ELECTRONS, EROSION, MAGNETIC FIELDS, MEASUREMENT, MODELS, PERTURBATIONS, PLASMA DEVICES, PLASMA ENGINES, PLASMAS(PHYSICS), PROPULSION SYSTEMS, PULSES, RATES, RECTANGULAR BODIES, RELIABILITY, SAMPLING, SELF CONTAINED, STABILITY, TEMPERATURE, TEST EQUIPMENT, THEORY, THRUSTERS, TRANSVERSE.

IDENTIFIERS: (U) Plasma thrusters, *Plasma engines, Joule heating, PE61102F, WUAFOSR2308A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 857 14/2 17/9 20/4 4/2

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF AEROSPACE AND OCE AN ENGINEERING

(U) Three-Dimensional Rapidly Scanning Laser Doppler Velocimeter with Low SNR Signal Processing.

DESCRIPTIVE NOTE: Final rept. 1 Feb 88-30 Nov 90,

NOV 90 74P

PERSONAL AUTHORS: Shinpaugh, Kevin A.; Simpson, Roger L.

REPORT NO. VPI-AOE-179

CONTRACT NO. F49620-88-C-0043

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0848, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A rapidly scanning directionally sensitive three-velocity-component laser Doppler velocimeter (RSLDV) has been designed. It permits rapid scans through three-dimensional flows to obtain space-time velocity information and almost instantaneous velocity profiles vital to understanding such flows. A flexible optical system allows for easy variation of the fringe spacing as well as the location and size of the measurement volume. Several optical techniques to maintain coincidence between the horizontal, U and W, and vertical, V, probe volumes were investigated. A lens, used like a prism, and two plane mirrors for the out of plane scanning laser beam maintains good coincidence between the probe volumes, while maintaining some flexibility. Moving fringe patterns in the horizontal and vertical planes are produced by a dual water Bragg cell. The Doppler frequency is independent of the position of the receiving optics, and only one photomultiplier tube (PMT) is needed to receive the signals for all three velocity components.

DESCRIPTORS: (U) , BRAGG ANGLE, CELLS, DOPPLER EFFECT, DOPPLER SYSTEMS, FREQUENCY, HORIZONTAL ORIENTATION, LASER BEAMS, LASER VELOCIMETERS, LASERS, MEASUREMENT,

AD-A238 857 CONTINUED

METHODOLOGY, MIRRORS, MOTION, OPTICAL EQUIPMENT, OPTICAL SCANNING, OPTICS, PATTERNS, PHOTOMULTIPLIER TUBES, POSITION(LOCATION), PROBES, PROFILES, SIGNAL PROCESSING, THREE DIMENSIONAL FLOW, VELOCITY, VERTICAL ORIENTATION, VOLUME, WATER.

IDENTIFIERS: (U) *Laser velocimeter, *Doppler anemometer, Array processors, Photomultiplier tubes, PE61102F, WUAFOSR2307A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 855 20/4

STANFORD UNIV CA

(U) Flow Control.

DESCRIPTIVE NOTE: Final rept.,

APR 91 9P

PERSONAL AUTHORS: Reynolds, W. C.

CONTRACT NO. F49620-88-K-0020

MONITOR: AFOSR
TR-91-0645

UNCLASSIFIED REPORT

ABSTRACT: (U) This report outlines a coordinated set of research programs on flow control. The work was carried out by a team of experts in fluid mechanics and automatic control. Jets, turbulent boundary layers near separation, and delta wing flows formed the basis for these studies aimed primarily at developing fundamentals needed for active control of flows of technical interest.

DESCRIPTORS: (U) , AUTOMATIC, CONTROL, DELTA WINGS, FLOW, FLUID MECHANICS, RESEARCH MANAGEMENT.

IDENTIFIERS: (U) *Boundary layer control, Flow control, Turbulent flow.

AD-A238 827 6/5

INTERNATIONAL SOCIETY FOR CHRONOBIOLOGY BELTSVILLE MD

(U) Annual Review of Chronopharmacology. Volume 7. Biological Rhythms and Medications. Proceedings of the Conference of Chronopharmacology Held in Nice, France on 12-15 March 1990.

90 365P

PERSONAL AUTHORS: Reinberg, A.; Smolensky, M.; Labrecque, G.

CONTRACT NO. AFOSR-90-0264

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0550, AFOSR

UNCLASSIFIED REPORT

Availability: Pergamon Press, Inc., Maxwell House, Elmsford, NY 10523. PC $191.00. No copies furnished by DTIC.

ABSTRACT: (U) This grant funded in part the Fourth International Conference on Biological Rhythms and Medications held in Nice, France 12-15 March 1990, sponsored by the International Society for Chronobiology. The published Proceedings compiled in this final report deal with seven major themes: (1) neurobiology, (2) endocrinology and gastroenterology, (3) cardiovascular agents, (4) metabolic aspects, (5) immunology and cancer, (6) general chronopharmacology and (7) chronotherapeutics.

DESCRIPTORS: (U) , BIOLOGICAL RHYTHMS, CANCER, CHRONOBIOLOGY, ENDOCRINOLOGY, IMMUNOLOGY, INTERNATIONAL, NEUROBIOLOGY, SOCIETIES, SYMPOSIA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 811 20/11

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF CIVIL ENGINEERING MECHANICS AND METALL URGY

(U) Eshelby Forces Associated with an Advancing Crack Surrounded by Vanishingly Small Inhomogeneity.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-Aug 90,

MAY 91 47P

PERSONAL AUTHORS: Wu, Chien H.

CONTRACT NO. AFOSR-89-0503

MONITOR: AFOSR, XF
TR-91-0871, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The propagation of a crack surrounded by damage is simplistically replaced by that of a crack lodged in a vanishingly thin or small elastic inhomogeneity. This latter problem is asymptotically analyzed and numerically solved via the use of Fast Fourier Transform Algorithm. A re-examination of Mindlin's grade-3 elasticity is thoroughly carried out to reveal the interaction between mechanical loading and surface tension.

DESCRIPTORS: (U) , ALGORITHMS, ELASTIC PROPERTIES, FAST FOURIER TRANSFORMS, HETEROGENEITY, MECHANICAL PROPERTIES, SURFACE TENSION, THINNESS.

AD-A238 792 7/4

COLUMBIA UNIV NEW YORK LOWELL MEMORIAL LIBRARY

(U) Photochemistry of Large-Ring 2-Phenylcycloalkanones in Various Environments. Intramolecular Para Coupling Products of Acyl Benzyl Biradicals,

91 5P

PERSONAL AUTHORS: Han, Nianhe; Lei, Xuegong; Turro, Nicholas J.

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0847, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Organic Chemistry, v56 n8 p2927-2930 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The photochemistry of five- and six-membered cycloalkanones has played an important role in mechanistic organic chemistry and in our knowledge of biradicals. The photolysis of 2-phenylcyclopentanone and cyclohexanone yields alkenals in good yields. However, for the photochemistry of large-ring unsubstituted cycloalkanones, the dominant primary process in hydrogen abstraction, which affords cyclobutanol derivatives, although 2-methyl-substituted cyclododecanones undergo both cleavage and hydrogen abstraction. We report the photochemistry of large-ring-2-phenylcycloalkanones (11- to 15- membered) that produce cyclophanes as major products under different conditions.

DESCRIPTORS: (U) , CLEAVAGE, CYCLOHEXANONES, HYDROGEN, ORGANIC CHEMISTRY, PHOTOCHEMICAL REACTIONS, YIELD.

IDENTIFIERS: (U) *Photochemistry, Cyclophanes, Biradicals, WUAFOSR2303B2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 791 7/6 11/2 7/2

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) DURIP Synthesis and Study of Preceramic Polymers/ Ceramic Precursors, Metal Silicides, and Polymers with Unique Optical and Electronic Properties.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 89-30 Nov 90,

MAY 91 14P

PERSONAL AUTHORS: Tilley, T. D.

CONTRACT NO. AFOSR-89-0174

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0637, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The thermal analysis system and tube furnace have been used to conduct initial studies on the conversion of alkoxysiloxy derivatives to metal silicate solid state materials. These results, pertaining titanium, zirconium, and hafnium, are described. Interest in low-temperature chemical routes to ceramic materials is based largely on the potential for generating metastable structures with unusual properties, or on development of improved processing methods. The sol-gel method in particular has attracted attention as a low temperature route to oxides. This method can be extended to the synthesis of mixed metal oxides, however the formation of homogeneous materials can be complicated by differences in hydrolysis rates for the starting metal compounds. Sol-gel processes have been utilized to produce titanium oxides or zirconium oxides containing silicates in the form of thin films, fibers, or monoliths. Materials of this type find applications that take advantage of their optical properties, chemical inertness, high melting points, insulating properties, and fracture toughness.

DESCRIPTORS: (U) , CERAMIC MATERIALS, CHEMICALS, CONVERSION, ELECTROMAGNETIC PROPERTIES, FRACTURE(MECHANICS), FURNACES, HAFNIUM, HIGH TEMPERATURE,

AD-A238 791

AD-A238 791 CONTINUED

HOMOGENEITY, HYDROLYSIS, INSULATION, LOW TEMPERATURE, MATERIALS, MELTING POINT, METAL COMPOUNDS, METALS, METASTABLE STATE, METHODOLOGY, MIXING, OPTICAL PROPERTIES, OXIDES, POLYMERS, PRECURSORS, PROCESSING, RATES, ROUTING, SILICATES, SILICIDES, STARTING, STRUCTURES, SYNTHESIS, THERMAL ANALYSIS, THIN FILMS, TITANIUM, TITANIUM OXIDES, TOUGHNESS, TUBES, ZIRCONIUM, ZIRCONIUM OXIDES.

IDENTIFIERS: (U) *Ceramic materials, *Polymers, Silicides, Metals, Optical properties, Synthesis(Chemistry), Electronic properties, Sol gel processes, WUAFOSR3484A2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 790 6/5

GEORGE WASHINGTON UNIV MEDICAL CENTER WASHINGTON DC DEPT OF MEDICINE

(U) Free Radical Mechanisms of Xenobiotic Mammalian Cytotoxicities.

DESCRIPTIVE NOTE: Final rept.,

JUN 91 38P

PERSONAL AUTHORS: Dickens, Benjamin F.

CONTRACT NO. AFOSR-88-0016

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0632, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our initial goal was to identify if free radical mechanisms are involved in the cytotoxicity of a number of IRP volume I and II chemicals. We found that a number of these agents act to enhance membrane lipid peroxidation in response to a standard dose of exogenous free radicals. Using chlorinated hydrocarbons (carbon tetrachloride, trichloroethylene, dichloroethylene, trichloroethane, dichloroethane) as a model for other IRP chemicals, we established conditions to measure lipid peroxidation in cultured smooth muscle and endothelial cells. These agents induced lipid peroxidation in the presence of physiological levels of iron in these vascular cells by a mechanism that doesn't require cytochrome P-450. Antiradical treatment with deferoxamine and probucol (but not SOD, catalase, or mannitol) appear to reduce the toxicity of these agents.

DESCRIPTORS: (U) , CARBON TETRACHLORIDE, CARDIOVASCULAR SYSTEM, CATALASE, CELLS, CELLS(BIOLOGY), CHEMICALS, CHLORINATED HYDROCARBONS, CHLOROETHANES, DOSAGE, ENDOTHELIUM, FREE RADICALS, IRON, LIPIDS, MANNITOL, MEASUREMENT, MEMBRANES(BIOLOGY), MUSCLES, OXIDATION, PHYSIOLOGY, TOXICITY, TRICHLOROETHANES, TRICHLOROETHYLENE, VOLUME.

AD-A238 790

AD-A238 790 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, *Free radical, IRP Volume I and II chemicals, *Cytotoxicity membrane lipid peroxidation, Spin trapping, ESR, Cell culture, Endothelial cell, *Smooth muscle cell.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 789 20/8

PENNSYLVANIA STATE UNIV UNIVERSITY PARK LAB FOR ELEMENTARY PARTICLE SCIENCE

(U) A Measurement of Charged and Neutral Elementary Particles Emitted from Antiproton Annihilation at Rest in Heavy Nuclei.

DESCRIPTIVE NOTE: Final rept. 1 May 87-30 Apr 91,

JUN 89 150P

PERSONAL AUTHORS: Smith, Gerald A.

CONTRACT NO. AFOSR-87-0246

PROJECT NO. 2301

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0641, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The first complete spectrum of neutrons from antiproton induced fission of Uranium has been obtained. Features of the spectrum are explained by three processes: emission of prompt ejectiles driven from the nucleus by pions in the intranuclear cascade, evaporation of neutrons from the excited nucleus before fission, and de-excitation of fission fragments. The temperature of the fission neutrons is about 67% higher than normal fission, indicating large residual energy deposited in the fission fragments. Hence, the fission process serves as a window into the excitation process itself. Results have also been obtained on gamma-rays associated with de-excitation of fission fragments after neutron emission. With respect to normal fission, the relative yield of gamma-rays to neutrons is suppressed, but the temperature of the gamma-rays is higher. Energy transfer by pi-zeros in the intranculear cascade initiated by antiproton annihilation at rest in carbon and uranium has been measured. The prospects for initiating multifragmentation and disintegration of heavy nuclei appear good.

DESCRIPTORS: (U) , ANNIHILATION REACTIONS, ANTIPROTONS, CARBON, DISINTEGRATION, ELEMENTARY PARTICLES, EMISSION, ENERGY, EVAPORATION, EXCITATION, FISSION, FISSION

AD-A238 789

AD-A238 789 CONTINUED

NEUTRONS, INDICATORS, NEUTRAL, NEUTRONS, NUCLEAR PARTICLES, NUCLEI, RESIDUALS, REST, SPECTRA, URANIUM, YIELD.

IDENTIFIERS: (U) *Annihilation reactions, *Antiprotons, *Neutron spectrum, WUAFOSR2301B2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 788 6/1

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Time-Frequency Factors in Auditory Perception.

DESCRIPTIVE NOTE: Final rept. 15 Apr 87-14 Apr 90,

FEB 91 1P

PERSONAL AUTHORS: Wakefield, Gregory

CONTRACT NO. AFOSR-87-0198

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF
TR-91-0638, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The final report of this year research program summarizes our experimental and theoretical results concerning what we have termed cross-spectral temporal resolution. The experiments measured the measured the sensitivity to variations in several of the stimulus parameters. From these experimental results, three theoretical results have been obtained. The first of these concerns the form of the ideal receiver for cross-spectral temporal resolution of amplitude modulated carries. This model incorporates an auditory-nerve model and is based entirely on point-process statistics. The second of these concerns the form of the ideal receiver for cross-spectral temporal resolution of frequency modulated carriers. This model fails to account for the experimental results, which are, in general, much worse than would be predicted from the model and from simple extension of the amplitude-modulation results. On th basis of this failure, a third general theoretical results has addressed the problem of uncertainty in auditory processing.

DESCRIPTORS: (U) , AUDITORY PERCEPTION, AUDITORY SIGNALS, FREQUENCY, PARAMETERS, RECEIVERS, SIGNAL PROCESSING, STIMULI, TIME, UNCERTAINTY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6.

AD-A238 788

AD-A238 787 11/4 11/6.1 11/6.2

AUBURN UNIV AL

(U) Investigation of the Properties of Titanium-Carbon Hybrid Alloys.

DESCRIPTIVE NOTE: Final rept. Dec 87-Apr 91,

JUN 91 78P

PERSONAL AUTHORS: Chin, Bryan A.; Zee, Ralph H.

CONTRACT NO. AFOSR-88-0038

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0654, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The effects of 6% aluminum additions on the compressive properties and microhardness of titanium-titanium carbide composites were investigated. Composites containing 40-50% TiC by volume were produced using standard casting procedures from the melt. Enhanced strength of Ti-TiC composites at room temperature and elevated temperatures upon Al additions was found. Strengthening mechanism was also studied. The tensile properties of Ti-TiC composites was most sensitive to the size and distribution of TiC particles. Tensile properties with different TiC size which was controlled by cooling rate during melting were studied. Results show that 50% improvement of ultimate tensile strength could be achieved by microstructure refinement. Titanium-base alloys are a potential candidate for space applications because of their light weight, high specific modulus, high specific strength, and good corrosion resistance. The TiC system reinforced metal-matrix composites were produced by traditional ingot metallurgy. The use of this metallurgical method has been developed in an attempt to improve mechanical properties through the presence of a ductile metal matrix. Good strength and ductility have been achieved in compression.

DESCRIPTORS: (U) , ALLOYS, BASE METAL, CASTING, CASTINGS, COMPOSITE MATERIALS, COMPRESSIVE PROPERTIES, CONTROL,

AD-A238 787

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 787 CONTINUED

COOLING, CORROSION RESISTANCE, DUCTILITY, HIGH STRENGTH, HIGH TEMPERATURE, LIGHTWEIGHT, MATRIX MATERIALS, MECHANICAL PROPERTIES, METALLURGY, METALS, MICROHARDNESS, MICROSTRUCTURE, PARTICLES, RATES, REFINING, REINFORCING MATERIALS, ROOM TEMPERATURE, SPACE TECHNOLOGY, TENSILE PROPERTIES, TENSILE STRENGTH, TITANIUM ALLOYS.

IDENTIFIERS: (U) *Metal matrix composites, *Ceramic materials, High temperature, Microhardness, *Titanium carbides, Strength(Mechanics), *Titanium, Space based, Casting, WUAFOSR2306A2, PE61102F.

IAC NO. MMC-703366

IAC DOCUMENT TYPE: MMCIAC - HARD COPY --

AD-A238 787

AD-A238 788 5/8 12/5

NEW YORK UNIV MEDICAL CENTER NY DEPT OF PSYCHIATRY

(U) Computing With Neural Maps: Application to Perceptual and Cognitive Functions.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 89-30 Aug 90,

JUL 91 7P

PERSONAL AUTHORS: Schwartz, Eric L.

CONTRACT NO. AFOSR-88-0275

PROJECT NO. 2313

TASK NO. A8

MONITOR: AFOSR, XF
TR-91-0631, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past year these investigators: (1) Illustrated application of computer science to neuroscience at three levels: measuring, modeling, and understanding the computational function of the columnar pattern of ocular dominance in primate visual cortex; (2) Demonstrated an algorithm for modeling polymap architectures of the cerebral neocortex, where the term 'polymap' emphasizes the joint occurrence of topographic mapping of multiple sub-modalities, interlaced in the form of macroscopic patches ('columns') into a single cortical lamina; (3) Considered a space-variant sensor design based on the conformal mapping of the halp disk, w=log (z+a), a 0, which characterizes the anatomical structure of the primate and human visual systems. (4) Showed that the best algorithm for fusing multiple space-variant fixations of the same scene show, under certain assumptions of pixel distribution, is indeed optimal in a least-squared-error sense; (5) Analyzed the characteristics of a synthetic sensor comparable, with respect to field width and resolution, to the primate visual system; (6) Showed a quantitative measurement of the macaque ocular dominance column pattern, based on measurement of local power spectral densities of a computer reconstruction and numerical flattening of VI.

DESCRIPTORS: (U) , ALGORITHMS, ANATOMY, COGNITION,

AD-A238 788

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 786 CONTINUED

COMPUTATIONS, COMPUTERS, CONFORMAL MAPPING, DETECTORS, EYE, FUNCTIONS, HUMANS, MAPPING, MAPS, MEASUREMENT, NERVOUS SYSTEM, PATTERNS, POWER SPECTRA, PRIMATES, SPECTRAL ENERGY DISTRIBUTION, TOPOGRAPHIC MAPS, VISION, VISUAL CORTEX, WIDTH.

IDENTIFIERS: (U) *Cognition, Computer applications, Computerized simulation, *Neurophysiology, *Computer vision, WUAFOSR2313A8, PE61102F.

AD-A238 782 23/1

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

(U) Parametric Study of Diffusion-Enhancement Networks for Spatiotemporal Grouping in Real-Time Artificial Vision.

DESCRIPTIVE NOTE: Annual summary rept. no. 1, Oct 89-Mar 91,

JUN 91 42P

PERSONAL AUTHORS: Waxman, A. M.; Cunningham, R. K.

CONTRACT NO. AFOSR-PD-90-0001

PROJECT NO. 2313

TASK NO. A8

MONITOR: AFOSR, XF
TR-91-0643, AFOSR

UNCLASSIFIED REPORT

Availability: Document partially illegible

ABSTRACT: (U) This is the first Annual Technical Summary of the MIT Lincoln Laboratory effort into the parametric study of diffusion-enhancement networks for spatiotemporal grouping in real-time artificial vision. Spatiotemporal grouping phenomena are examined in the context of static and time-varying imagery. Dynamics that exhibit static feature grouping on multiple scales as a function of time and long-range apparent motion between time-varying inputs are developed for a biologically plausible diffusion-enhancement bilayer. The architecture consists of a diffusion and a contrast-enhancement layer coupled by feedforward and feedback connections: input is provided by a separate feature extracting layer. The model is cast as an analog circuit that is realizable in VSLI, the parameters of which are selected to satisfy a psychophysical database on apparent motion.

DESCRIPTORS: (U) , , ANALOG SYSTEMS, CIRCUITS, DATA BASES, DYNAMICS, EXTRACTION, LAYERS, LONG RANGE(DISTANCE), MOTION, PARAMETRIC ANALYSIS, PSYCHOPHYSICS, REAL TIME, SCALE, STATICS, VISION.

IDENTIFIERS: (U) WUAFOSR2313A8, PE61102F, *Neural

AD-A238 782

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 782 CONTINUED

networks, Astrocyte glial networks, Diffusion enhancement, Long-range apparent motion, Spatiotemporal grouping dynamics, Interference suppression..

AD-A238 781 5/2

GORDON RESEARCH CONFERENCES INC KINGSTON RI

(U) The Gordon Conference on Inorganic Chemistry Held in Wolfboro, New Hampshire on 30 July-3 August 1990.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Apr 91,

JUN 91 65P

PERSONAL AUTHORS: Cruickshank, Alexander M.

CONTRACT NO. AFOSR-89-0299

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0836, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Six Gordon Conferences were supported by AFOSR during 1990. The Conference on Inorganic Chemistry was held in Wolfboro, NH July 30 to August 3. Total attendance was 98. 22 papers and 40 posters were presented. The Conference on Glass was held in Tifton, NH, June 25-29. Total attendance was 80 including 5 from Europe and Japan. 18 talks and 24 posters were presented. The Conference on Biocatalysis was held in Plymouth, NH, June 24-29. Total attendance was 113. 26 papers and 30 posters were presented. The Conference on Dielectric Phenomena was held in Plymouth, NH, July 22-27. Total attendance was 76. 20 papers and 15 posters were presented. The Conference on Physical Electrochemistry was held in New London, NH, July 29 to August 3. The Conference on Organometallic Chemistry was held in Newport, RI, June 24-29. Total attendance was 134. 28 papers and 57 posters were presented.

DESCRIPTORS: (U) , CHEMISTRY, DIELECTRICS, ELECTROCHEMISTRY, EUROPE, GLASS, INORGANIC CHEMISTRY, JAPAN, NEW HAMPSHIRE, ORGANOMETALLIC COMPOUNDS, PHYSICAL CHEMISTRY, SYMPOSIA.

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 755 12/9 12/4

NETROLOGIC INC DAYTON OH

(U) Microcomputer-Based Vehicle Routing and Scheduling.

DESCRIPTIVE NOTE: Final rept.

JUN 91 56P

CONTRACT NO. F49620-90-C-0049

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-91-0665

UNCLASSIFIED REPORT

ABSTRACT: (U) Netrologic has designed and implemented a system that uses alternative ways of employing methods of artificial intelligence in conjunction with heuristic mathematical models for solving vehicle routing problems and applied them to the Air Force LOGAIR cargo handling systems. The artificial intelligence problem solving techniques involve genetic algorithms and set partitioning algorithms as applied to the LOGAIR vehicle routing problem.

DESCRIPTORS: (U) , AIR FORCE, ALGORITHMS, ARTIFICIAL INTELLIGENCE, CARGO HANDLING, GENETICS, HEURISTIC METHODS, MATHEMATICAL MODELS, PROBLEM SOLVING, ROUTING, VEHICLES.

IDENTIFIERS: (U) *Artificial intelligence, *Routing, *Scheduling, Microcomputers.

AD-A238 732 7/2

TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Adsorption of Pyridine on Silica Gels,

91 8P

PERSONAL AUTHORS: Nikiel, L.; Zerda, T. W.

CONTRACT NO. AFOSR-90-0165

PROJECT NO. 3398

TASK NO. A7

MONITOR: AFOSR, XF
TR-91-0648, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, v95 n10 p4063-4069 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Raman spectra of pyridine adsorbed at silica surface are reported as a function of surface coverage, ranging from a fraction of a monolayer to completely filled pores. It is observed that pyridine is preferentially adsorbed by silica, and it is suggested that the process results in a bilayer structure of the interface. The increased concentration of pyridine in silica pores in comparison with the concentration of pyridine in binary mixtures in the reservoir outside of the sample is reported for mixtures with CCl4,CH3NO2, and to a lesser extent, (CH3)2CO and CHCl3.

DESCRIPTORS: (U) , ADSORPTION, GELS, LAYERS, MIXTURES, RAMAN SPECTRA, SILICON DIOXIDE, SURFACES.

IDENTIFIERS: (U) Silica, *Sol Gel glass, Silica surface, PE61103F, WUAFOSR3398A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 725 11/4 11/2 11/8.1 20/2
20/12 20/3 20/5 20/6

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Defects in Materials. Materials Research Society Symposium Proceedings, Volume 209.

DESCRIPTIVE NOTE: Final rept. 15 Nov 90-14 Nov 91,

91 947P

PERSONAL AUTHORS: Bristowe, Paul D.; Epperson, J. E.; Griffith, Joseph E.; Lilienta1-Weber, Zuzanna

CONTRACT NO. AFOSR-91-0088

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-91-0652, AFOSR

UNCLASSIFIED REPORT

Availability: Materials Research Society, 9800 McKnight Rd., Pittsburgh, PA 15237-6005, PC$57.00. No copies furnished by DTIC.

SUPPLEMENTARY NOTE: Proceedings of a symposium held in Boston, Massachusetts, 26-29 Nov 90.

ABSTRACT: (U) Partial contents include the following: (1) Characterization and computerized simulation of defects in materials; (2) Structure of grain boundaries in nanophase materials; (3) Polycrystalline materials; (4) Diffraction effects from twist boundaries in gold; (5) Effect of hydrogen on the electronic structure of a grain boundary in iron; (6) Interatomic interactions; (7) X ray scattering from highly distorted lattices undergoing phase separation and phase transformation; (8) microstructure analysis using X ray diffraction and transmission electron microscopy; (9) Peculiar doping behavior of silicon; (10) Molecular dynamics studies of defects in silicon; (11) Molecular dynamics simulations of steps at crystal surfaces: (12) Defect generation and motion in polyethylene like crystals, analyzed by simulation with supercomputers; (13) Point defects and line defects; (14) Diffusion mechanisms; (15)

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Photoconductivity of highly disordered carbon fibers; (16) Defect analysis and defects in semiconductors; (17) Spectroscopy study of hydrogen induced defects; (18) The precipitation of nickel and copper at grain boundaries in silicon; (19) Interfaces and surfaces; (20) Defects in oxide superconductors; and (21) Defect network in superconducting ceramic oxides and ceramic materials studied by neutron and proton irradiation.

DESCRIPTORS: (U) , BOUNDARIES, CARBON FIBERS, CERAMIC MATERIALS, COMPUTERIZED SIMULATION, COPPER, CRYSTALS, DEFECT ANALYSIS, DEFECTS(MATERIALS), DIFFRACTION, DIFFUSION, DOPING, DYNAMICS, ELECTRON MICROSCOPY, ELECTRONICS, GOLD, GRAIN BOUNDARIES, HYDROGEN, IRON, IRRADIATION, MATERIALS, MICROSTRUCTURE, MOLECULAR PROPERTIES, NETWORKS, NICKEL, ORDER DISORDER TRANSFORMATIONS, OXIDES, PHASE, PHASE TRANSFORMATIONS, PHOTOCONDUCTIVITY, POINT DEFECTS, POLYCRYSTALLINE, POLYETHYLENE, PRECIPITATION, PROTONS, SEMICONDUCTORS, SEPARATION, SILICON, SIMULATION, SPECTROSCOPY, SUPERCOMPUTERS, SUPERCONDUCTORS, SURFACES, TRANSMITTANCE, TWIST(MOTION), X RAY DIFFRACTION, X RAY SCATTERING.

IDENTIFIERS: (U) *Defects(Materials), Crystal defects, *Composite materials, *Materials, Crystal lattices, Symposia, Thin films, Pe61102F, WUAFOSR2305C1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 719 6/5

PENNSYLVANIA UNIV PHILADELPHIA DEPT OF CHEMISTRY

(U) Photochromic Polyphosphazenes with Spiropyran Units,

91 7P

PERSONAL AUTHORS: Allcock, Harry R.; Kim, Chulhee

CONTRACT NO. AFOSR-89-0234

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0649, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Photochromic spireopyrans were linked to polyphosphazenes through diethyleneoxy or triethyleneoxy spacer units. The reversion of photogenerated merocyanine groups to spiropyran units in these polymers in various solvents or in the solid state was investigated. The reversion rate in the polymeric solid state was much slower than in solution. In solution the rate decreased as the solvent polarity decreased. A phosphazene polymer with spiropyran units as the only side groups present showed a slower merocyanine to spiropyran reversion rate than did a mixed-substituent polyphosphazene with a lower loading of the chromophores. Presumably this is a consequence of steric effects. A polymer with spiropyran units linked via diethyleneoxy spacer groups underwent the merocyanine to spiropyran reversion at a slower rate than did a polymer with the spiropyran units connected through a triethyleneoxy spacer unit. Unlike the behavior of the free small-molecule spiropyran, the merocyanine relaxation in the polymeric species showed deviations from a first-order relationship in solution and in the solid state.

DESCRIPTORS: (U) , CHROMOPHORES, CYANINE, LINKAGES, MERCURY COMPOUNDS, PHOSPHAZENE, PHOTOCHROMIC MATERIALS, POLARITY, POLYMERS, RELAXATION, SIDES, SOLVENTS, SPACERS.

IDENTIFIERS: (U) Polymers, *Phosphazenes, *Photochromic, Synthesis, WUAFOSR2303B2, PE61102F.

AD-A238 719

AD-A238 718 10/2 9/1 20/12

TRI-CITIES UNIVERSITY CENTER RICHLAND WA

(U) Investigation of High Efficiency Monolithic Multibandgap Solar Cells.

DESCRIPTIVE NOTE: Final rept. 15 Nov 88-14 Nov 90,

JUN 91 49P

PERSONAL AUTHORS: Olsen, Lawrence

CONTRACT NO. AFOSR-89-0182

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XF
TR-91-0653, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program concerned investigations of multibandgap solar cell structures with potential efficiencies greater than 40%. The basic concept utilized a monolithic stack of three or more cells based on Aluminum Gallium Arsenide and Indium Gallium Arsenide ternary compounds. In particular, the planned work for the two-year program was to involve research related to a three-cell stack comprised of a top Al.37Ga.63As cell, a middle Gallium arsenide cell and a bottom In.3Ga.7As cell. Efforts first concentrated on GaAs cell growth and fabrication, and then on AlGaAs film growth. Although significant progress was made in the development of AlGaAs film growth, efforts to grow InGaAs films and solar cells were not initiated. GaAs solar cells were fabricated from epi-wafers grown at WSU Tri-Cities. The cells had a p/n structure with Gold metallization and silicon monoxide anti-reflection coatings. Cells exhibited AM1.5 efficiencies greater than 21%. Studies of AlGaAs included development of procedures for growth of films of known aluminum concentration and measurement of minority carrier properties. The minority carrier diffusion length was found to be 0.6 micrometers for AlGaAs with a composition corresponding to 10% aluminum. Films with larger amounts of Al exhibited much lower values of diffusion length. Studies were conducted which determined that oxygen impurity levels in the AlGaAs were

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 718 CONTINUED

degrading minority carrier properties.

DESCRIPTORS: (U) , ALUMINUM, ALUMINUM GALLIUM ARSENIDES, ANTIREFLECTION COATINGS, CELLS, CELLS(BIOLOGY), CHARGE CARRIERS, CONCENTRATION(COMPOSITION), DIFFUSION, EFFICIENCY, FILMS, GALLIUM ARSENIDES, GOLD, GROWTH(GENERAL), HIGH RATE, IMPURITIES, LENGTH, LEVEL(QUANTITY), METALLIZING, MONOLITHIC STRUCTURES(ELECTRONICS), MONOXIDES, OXYGEN, SILICON COATINGS, SOLAR CELLS, STACKING, STRUCTURES, VALUE.

IDENTIFIERS: (U) *Solar cells, P Type semiconductors, N Type semiconductors, Wafers, WUAFOSR2301A7, PE61102F.

AD-A238 711 6/1

SAN FRANCISCO STATE UNIV TIBURON CA TIBURON CENTER FOR ENVIRONMENTAL STUDIES

(U) *Cellular Regulation of ADP-Ribosylation of Proteins. 4.* Conversion of Poly(ADP-Ribose) Polymerase Activity to NAD-Glycohydrolase during Retinoic Acid-Induced Differentiation of HL60 Cells.

91 9P

PERSONAL AUTHORS: Kirsten, Eva; Bauer, Pal I.; Kun, Ernest

CONTRACT NO. AFOSR-89-0231

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0650, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Experimental Cell Research, v194 p1-8, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Two enzymatic activities of the nuclear enzyme poly(ADP-ribose) polymerase or transferase (ADPRT, EC2.4.2.30), a DNA-associating abundant nuclear protein with multiple molecular activities, have been determined in HL60 cells prior to and after their exposure to 1 micromole retinoic acid, which results in the induction of differentiation to mature granulocytes in 4-5 days. The cellular concentration of immunoreactive ADPRT protein molecules in differentiation granulocytes remained unchanged compared to that in HL60 cells prior to retinoic acid addition as did the apparent activity of poly(ADP-ribose) glycohydrolase of nuclei.

DESCRIPTORS: (U) , CELLS, CONTROL, ENZYMES, GRANULOCYTES, MOLECULES, NUCLEI, PROTEINS, TRANSFERASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 706 20/14 3/2

ALABAMA UNIV IN HUNTSVILLE DEPT OF MECHANICAL ENGINEERING

(U) A Study of Coronal-Interplanetary Coupling Mechanisms.

DESCRIPTIVE NOTE: Final rept. 1 Nov 87-31 Mar 91,

APR 91 288P

PERSONAL AUTHORS: Wu, S. T.

REPORT NO. CSPAR531791WU

CONTRACT NO. AFOSR-88-0013

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR, XF
TR-19-0842, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) It is understood that the operations of military, as well as civilian, satellite and systems for communications, tracking and surveillance can be interrupted, degraded or even endangered as a result of powerful explosions on the surface of the sun called solar flares. These spectacular eruptions release shock waves, hot plasma clouds, highly accelerated atomic nuclei and burst of x-rays, ultra-violet and visible-band electromagnetic radiation into interplanetary space. When the path of propagation of these high-energy emissions intersects the Earth's magnetosphere, our terrestrial environment is impacted in various ways that may produce deleterious effects on military systems, both on the ground and in space. This investigation conducted a theoretical study of the dynamics of coronal-interplanetary coupling. It was demonstrated that photospheric shear motion could be a viable physical mechanism to understand the occurrence of solar flares. This study has laid the groundwork for solar flare prediction and their consequences on the geomagnetic storm.

DESCRIPTORS: (U) , CLOUDS, DYNAMICS, EARTH(PLANET), EMISSION, ENVIRONMENTS, EXPLOSIONS, GEOMAGNETISM, HIGH ENERGY, HIGH TEMPERATURE, INTERPLANETARY SPACE, MAGNETIC

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STORMS, MAGNETOSPHERE, MOTION, PATHS, PHOTOSPHERE, PHYSICAL PROPERTIES, PLASMAS(PHYSICS), PREDICTIONS, PROPAGATION, RELEASE, SHEAR PROPERTIES, SHOCK WAVES, SOLAR FLARES, SUN, TRACKING.

IDENTIFIERS: (U) Radio interference, Solar flares, PE61102F, WUAFOSR2311A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 701 20/10

CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Efficient Optical Logic, Interconnections and Processing Using Quantum Confined Structures.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 89-31 Mar 91,

MAY 91 55P

PERSONAL AUTHORS: Coldren, L. A.; Gossard, A. C.; Simes, R. J.; Yan, R. H.; Law, K. K.

REPORT NO. ECE-TR-91-11

CONTRACT NO. AFOSR-89-0549

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR, XF
TR-91-0662, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The work has been strongly focused on the development of high-efficiency surface-normal Fabry-Perot cavity modulators in particular the asymmetric Fabry-Perot modulator (AFPM). In contrast to the high-finesse, refractive index-tuned, symmetric cavity type of modulator (SFPM), on which we first reported under contract 85-0323, the AFPM utilizes the electroabsorptive properties of the intra-cavity medium- normally a GaAs-AlGaA multiple quantum well structure-to balance the initially unbalanced (asymmetric) mirrors of a low-finessee cavity, thus making it possible to achieve high contrast ratio, very efficient transfer function with low operating voltage, low insertion loss and, importantly, significantly wider optical bandwidth for the SFPM. During this period we made one of the initial demonstrations of the AFPM, where we achieved a contrast ratio of 22:1 in reflection, at a d.c. operating voltage of IIV, and with only 3.7dB insertion loss.

DESCRIPTORS: (U) , ASYMMETRY, BANDWIDTH, CAVITIES, CONFINEMENT(GENERAL), CONTRAST, EFFICIENCY, FABRY PEROT INTERFEROMETERS, INSERTION LOSS, LOGIC, LOW LOSS, MIRRORS,

AD-A238 701

AD-A238 701 CONTINUED

MODULATORS, OPTICAL PROPERTIES, QUANTUM THEORY, RATIOS, STRUCTURES, SYMMETRY, TRANSFER FUNCTIONS.

IDENTIFIERS: (U) WUAFOSR2305B4, *Light modulators, Quantum wells, AFPM(Asymmetric Fabry Perot Modulators).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 686 7/2 11/6.1 11/6.2 21/5

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Fatigue and Fracture of Intermetallic Alloys.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 90-31 Mar 91,

MAY 91 47P

PERSONAL AUTHORS: Cooper, C. V.; Inoue, H. R.; Giamei, A. F.; Favrow, L. H.

REPORT NO. R91-917992-2

CONTRACT NO. F49620-89-C-0047

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR91-0668, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Future aircraft gas turbine engines will, most likely, utilize hot-section materials based on systems other than nickel-base superalloys. The identification of new systems has been motivated by the quest for higher combustion temperatures to satisfy the need for greater thrust-to-weight ratios and higher operating efficiencies. Among the potential systems is the broad class of materials known as intermetallics. Research and development has gone into the study of based on the titanium/aluminum system, often with the focus on alloy development through ternary compounds and quaternary additions as well as thermomechanical processing. Three ordered compounds based on this binary system have been investigated to varying degrees: titanium alloys/aluminum and aluminum alloys/Because of the tendency to form oxidation protective alumina films and its low density Al3Ti has held particular attraction. Despite its oxidation resistance, Al3Ti has remained understudied. Through the addition of certain ternary transition metals, including iron, copper, or nickel, a phase transition can be induced. Being a crystal structure with higher symmetry over the D022, the L1 sub 2 possesses in mechanical behavior over the ordered tetragonal structure due to the increase in the number of

AD-A238 686

AD-A238 686 CONTINUED

active slip systems and strain compatibility in polycrystals.

DESCRIPTORS: (U) , AIRCRAFT ENGINES, ALUMINUM, ALUMINUM ALLOYS, ALUMINUM OXIDES, COMBUSTION, COPPER, CRYSTAL STRUCTURE, FILMS, FRACTURE(MECHANICS), GAS TURBINES, HIGH TEMPERATURE, IDENTIFICATION SYSTEMS, INTERMETALLIC COMPOUNDS, IRON, MATERIALS, MECHANICAL PROPERTIES, NICKEL, NICKEL ALLOYS, OXIDATION, OXIDATION RESISTANCE, PHASE TRANSFORMATIONS, PROCESSING, RATIOS, SUPERALLOYS, SYMMETRY, TERNARY COMPOUNDS, THERMOMECHANICS, THRUST, TITANIUM, TITANIUM ALLOYS, TRANSITION METALS, WEIGHT.

IDENTIFIERS: (U) *Intermetallic compounds, *Fatigue(Mechanics), *Fracture(Mechanics), Microstructure, Gas turbines, Jet engines, High temperatures, Casting, Hot isostatic pressing, Yield point, Ductility, Brittleness, WUAFOSR2306A1, PE61102F.

AD-A238 686

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 664 6/5

EYE RESEARCH INST OF RETINA FOUNDATION BOSTON MA

(U) Eye Movements and Spatial Pattern Vision.

DESCRIPTIVE NOTE: Annual rept. 1 May 90-30 Apr 01,

JUL 91 16P

PERSONAL AUTHORS: Arend, Lawrence E.

CONTRACT NO. AFOSR-89-0377

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0651, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Models of human lightness and color perception must take account of color constancy, a tendancy for apparent surface color to be relatively independent of the color and intensity of the illuminating light source. Our observers matched the lightnesses (apparent reflectances) and brightnesses (apparent luminances) of regions in simple and complex achromatic spatial patterns. The data showed that the observers' knowledge of the surface reflectances was unaffected by brightness changes due to varying illuminance. A third perceptual dimension, local brightness contrast, was different from both lightness and brightness. In further experiments we found that moving a patch from a black background to a white background could produce an error of apparent surface color of about 1.5 Munsell Value steps. Similar experiments at mesopic mean luminances revealed that the brightness contrast produced by a fixed luminance contrast declines with mean luminance.

DESCRIPTORS: (U) , BACKGROUND, BLACK(COLOR), BRIGHTNESS, COLOR VISION, COLORS, CONTRAST, EYE MOVEMENTS, HUMANS, ILLUMINATION, LIGHT SOURCES, LUMINANCE, MEAN, MODELS, PATTERNS, PERCEPTION, REFLECTANCE, SPATIAL DISTRIBUTION, SURFACES, VISION.

IDENTIFIERS: (U) WUAFOSR2313A5, PE61102F, Spatial

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AD-A238 664 CONTINUED

pattern vision, *Eye movements, Visual illusions, Color constancy, Color vision.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 663 8/5

SMITH-KETTLEWELL EYE RESEARCH INST SAN FRANCISCO CA

(U) Psychophysical Studies of Visual Cortical Function.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 88-31 Dec 90,

JUN 91 4P

PERSONAL AUTHORS: Nakayama, Ken

CONTRACT NO. AFOSR-88-0328

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0639, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work explored a variety of research areas, all directed towards obtaining an understanding of visual cortical function using psychophysical techniques. In particular, we examined visual search, visual attention, the encoding of occluding surfaces, and color filling-in. With respect to visual search, we found a new unexpected relation between distractor number and reaction time, showing that for particular tasks, performance improved when distractor number increased. With respect to visual attention we obtained new information to support the specific hypothesis which proposed that express saccades were due to a rapid disengagement of attention from the fixation. With respect to occluded surfaces, we provided a new theoretical framework to understand the large number of new results collected, suggesting the generic view principle. Finally, with respect to color filling-in, we found evidence that such a hypothetical process can be interrupted after the presentation of a stimulus and we evaluated its spatio-temporal time course.

DESCRIPTORS: (U) , HYPOTHESES, PSYCHOPHYSICS, REACTION TIME, SEARCHING, VISUAL PERCEPTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

AD-A238 663

AD-A238 643 11/4

MASSACHUSETTS UNIV AMHERST DEPT OF POLYMER SCIENCE AND ENGINEERING

(U) Phase Transformations, Ultrastructure and Properties of Rigid-Rod Polymers.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-30 Nov 90,

MAY 91 9P

PERSONAL AUTHORS: Thomas, Edwin L.

CONTRACT NO. F49620-89-C-0073

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0666, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The structure and properties of PBZT and PBO fibers and films depend critically in the detailed processing. Investigation of the coagulation process is of significant interest this is where the initial solid state polymer structure forms and the starting point from which all other post treatment microstructures evolve. Research under F49620-89-C-0073 has concerned an analysis of crystal solvates in a PBZT/PPA/water system, a general geometrical classification scheme for grain boundaries in PBZO, the analysis of compressive strength of PBZT/PEEK film laminates after sol-gel microcomposite processing, a morphological study of kink bands in PBZT and PBZO fibers to determine the cause of the relative weakness of the fibers in compression, and a microstructural examination of PBZO fibers as a function of heat treatment processing.

DESCRIPTORS: (U) , BANDS(STRIPS), CLASSIFICATION, COAGULATION, COMPRESSIVE PROPERTIES, CRYSTALS, FILMS, GEOMETRY, GRAIN BOUNDARIES, HEAT TREATMENT, LAMINATES, MICROSTRUCTURE, MORPHOLOGY, PHASE TRANSFORMATIONS, PROCESSING, SOLVATES, STRENGTH(MECHANICS), WATER SUPPLIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3

IAC NO. PL-055374

AD-A238 643

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 643 CONTINUED

IAC DOCUMENT TYPE: PLASTC - MICROFICHE --

IAC SUBJECT TERMS: P--(U)SOLVENT EFFECTS, HEAT TREATMENT EFFECTS, PHASE TRANSFORMATION, MORPHOLOGY, POLYBENZOTHIAZOLES, COMPRESSION STRENGTH, FIBERS, CRYSTALLINITY, SEM, X RAY SCATTERING, POLYPHENYLENES, KINKING, POLYBENZOXAZOLES, MICROSTRUCTURE, AZOLES, PEEK, COMPOSITES, STRENGTH RETENTION, LAMINATES, TENSILE STRENGTH, ZZ UNLIMITED.;

AD-A238 643

AD-A238 642 9/1

PHYSICAL OPTICS CORP TORRANCE CA

(U) An Optically Activated Modulator and GaAs-GaAlAs Compound Semiconductor Channel Waveguide.

DESCRIPTIVE NOTE: Final rept. 1 Sep90-30 Apr 91,

APR 91 53P

PERSONAL AUTHORS: Chen, Ray

CONTRACT NO. F49620-90-C-0068

PROJECT NO. 1602

TASK NO. F1

MONITOR: AFOSR, XF
TR-91-0664, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We proposed and then developed for the first time an optically activated modulator (OAM) and modulator array on GaAs-GaAlAs compound semiconductor channel waveguides. A channel waveguide device with an optical activation window of 5 um in diameter was fabricated. Optical activation was produced by using HeNe 631.8 nm wavelength as the free-carrier generator and a 1.3 um laser as the signal carrier. Thirty-three percent modulation depth was observed and 10-2 index modulation was experimentally confirmed on an OAM working in the phase modulation regime. OAMs working in both phase- and cutoff-modulation regimes were theoretically determined by considering the fluctuation of the waveguide confinement factor. 8.2dB modulation depth was observed on an OAM working at the cutoff regime. Furthermore, the activation source is in the mW power region which significantly reduces the size and cost of all optical switching devices.

DESCRIPTORS: (U) , ACTIVATION, ARRAYS, CHANNELS, CONFINEMENT(GENERAL), COSTS, DEPTH, LASERS, MODULATION, MODULATORS, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, OPTICAL SWITCHING, PHASE MODULATION, POWER, REGIONS, SIGNALS, SOURCES, WAVEGUIDES, WINDOWS.

IDENTIFIERS: (U) WUAFOSR1602F1.

AD-A238 642

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 641 15/5

DREXEL UNIV PHILADELPHIA PA

(U) Optimal Maintenance Strategies for Repairable Systems with General Degree of Repair.

DESCRIPTIVE NOTE: Final rept. 1 Apr-30 Sep 90,

SEP 90 11P

PERSONAL AUTHORS: Zuckerman, Dror

CONTRACT NO. AFOSR-91-0669

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0669, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our project focuses on a single unit system which is subject to random failure. The age of the system in service is maintained as a control variable. Upon failure, an age-dependent maintenance action specifying the degree of repair is taken by a controller. By employing analytical tools and numerical procedures, we investigate and characterize the structures of the optimal repair policy under a discounted cost optimality criterion. Special analytical and numerical effort is directed throughout the study for the development of efficient computational procedures for the optimal strategy.

DESCRIPTORS: (U) , COMPUTATIONS, COSTS, EFFICIENCY, FAILURE, MAINTENANCE, MATHEMATICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, POLICIES, REPAIR, STRATEGY.

IDENTIFIERS: (U) *Repair, *Maintenance, Strategic analysis, WUAFOSR2304A5, PE61102F.

AD-A238 641

AD-A238 615 20/5

PITTSBURGH UNIV PA

(U) A Systems Theoretic Investigation of Neuronal Network Properties of the Hippocampal Formation.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 89-30 Nov 90,

JUL 91 21P

PERSONAL AUTHORS: Berger, Theodore W.

CONTRACT NO. AFOSR-89-0197

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0672, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The major emphasis during this past year of AFOSR support has been on refining the transputer network as a simulation tool. The structure of the functioning parallel computer system has been expanded to include all of the available transputer elements and the inter-processor communication pathways have been simplified and made more efficient. In addition, the user's interface has been refined to make the simulations a working tool for the experimentalist. Additional efforts were placed on minimizing computational errors inherent in the simulations and in investigating the accuracy of the simulations against alternative complex patterns of stimuli such as doublets and triplets.

DESCRIPTORS: (U) , ACCURACY, CHIPS(ELECTRONICS), COMPUTATIONS, ERRORS, HIPPOCAMPUS, INTERFACES, MICROPROCESSORS, NERVE CELLS, NETWORKS, PARALLEL PROCESSORS, PATTERNS, SIMULATION, SIMULATORS, STIMULI, SUPERCOMPUTERS, THEORY, TOOLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1.

AD-A238 615

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 614 20/4

FLORIDA INST OF TECH MELBOURNE

(U) Asymptotic Analysis of the Fully Developed Region of an Incompressible, Free, Turbulent, Round Jet.

91 20P

PERSONAL AUTHORS: Bush, W. B.; Krishnamurthy, L.

CONTRACT NO. F49620-88-C-0040

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0687, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluid Mechanisms, v223 p93-111, 1991. Available to DTIC users only. No copies furnished by NTIS.

Reprint: Asymptotic Analysis of the Fully Developed Region of an Incompressible, Free, Turbulent, Round Jet.

DESCRIPTORS: (U) *JET FLOW, TURBULENT FLOW, INCOMPRESSIBLE FLOW, AXISYMMETRIC FLOW, NOZZLES, FAR FIELD, BOUNDARY VALUE PROBLEMS, REPRINTS.

IDENTIFIERS: (U) Round jets, Isothermal flow, PE61102F, WUAFOSR2304A3.

AD-A238 614

AD-A238 608 6/5

SMITH-KETTLEWELL EYE RESEARCH INST SAN FRANCISCO CA

(U) Coherence Determines Speed Discrimination.

90 12P

PERSONAL AUTHORS: Welch, Leslie; Browne, Samuel F.

CONTRACT NO. AFOSR-89-0035

PROJECT NO. 2313

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0609, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Perception, v19 p425-435 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The visual system must determine which elements in a scene to regard as parts of a single object and which to regard as different objects. We can create stimuli that are ambiguous, ie consistent wi.h more than one interpretation, and ask in what situations the stimulus elements are interpreted as part of a single object and when they are interpreted as multiple objects. The ambiguous stimuli in this study were moving plaid patterns--the sum of two drifting gratings with different orientations. Observers may see a rigid coherent plaid object moving in one direction, or may see two gratings moving in different directions sliding over one another. When the gratings have similar contrasts they appear to cohere and only the plaid speed is perceptually available; when the gratings have different contrasts they appear to slide and only the speeds of the gratings are perceived. Coherence thus determines that speed information is passed to higher stages of motion processing.

DESCRIPTORS: (U) , DISCRIMINATION, DRIFT, GRATINGS(SPECTRA), MOTION, ORIENTATION(DIRECTION), PROCESSING, SLIDING, STIMULI, VELOCITY, VISION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A9.

AD-A238 608

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 607 5/9

SMITH-KETTLEWELL EYE RESEARCH INST SAN FRANCISCO CA

(U) Neural Coding of Local and Global Motion,

91 3P

PERSONAL AUTHORS: McKee, Suzanne P.

CONTRACT NO. AFOSR-89-0035

PROJECT NO. 2313

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0608, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Cognitive Neuroscience, v1 n2 p97-98 1991. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Neural Coding of Local and Global Motion.

DESCRIPTORS: (U) *PSYCHOLOGY, *NEURAL NETS, *NEUROCHEMICAL TRANSMISSION, NEUROCHEMICAL CODING, REPRINTS.

IDENTIFIERS: (U) Global motion, PE61102F, WUAFOSR2313A9.

AD-A238 607

AD-A238 608 7/3

SAN FRANCISCO STATE UNIV TIBURON CA TIBURON CENTER FOR ENVIRONMENTAL STUDIES

(U) Apparent Role of Adenosine Diphosphoribosyl Transferase in the Development of Mytilus edulis and the Inhibition of Differentiation by Ligands of the Enzyme Protein,

91 6P

PERSONAL AUTHORS: Bauer, Pal I.; Kline, Kurt; Kun, Ernest

CONTRACT NO. AFOSR-89-0231

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0607, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in P.S.E.B.M., v196 p386-400 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The polky(ADP-ribose) polymerase or transferase (ADPTR) activity of developing embryos of Mytilus edulis increases with the progression of larval growth. ADPRT protein was partially purified from 2-hr-old embryos and identified by gel electrophoresis and immunotransblot, demonstrating crossed-reactivity with anti-ADPRT IgD produced against the calf thymus enzyme. Two inhibitors of ADPRT, benzamide, competing with NAD at the nicotinamide binding site, and 6-amino-1,2-benzopyrone, which competes with DNA at the DNA binding site(s), both selectively arrest differentiation at the prodissoconch stage. The DNA site-oriented inhibitor, 6-amino-1,2-benzopyrone, has a much larger differentiation arresting effect than benzamide. The arrest of differentiation by 6-amino-1,2-benzopyrone is reversible. A probable ecotoxicity of ADPRT ligands on mussel differentiation is proposed.

DESCRIPTORS: (U) , ADENOSINE, AMIDES, ARRESTING GEAR, BENZENE, DEOXYRIBONUCLEIC ACIDS, ELECTROPHORESIS, EMBRYOS, ENZYMES, GELS, INHIBITION, INHIBITORS, LIGANDS, MUSSELS, PROTEINS, SITES, TRANSFERASES.

AD-A238 608

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 606 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A238 605 6/5

SAN FRANCISCO STATE UNIV TIBURON CA TIBURON CENTER FOR ENVIRONMENTAL STUDIES

(U) Suppression of Dexamethasone-Stimulated DNA Synthesis in an Oncogene Construct Containing Rat Cell Line by a DNA Site-Oriented Ligand of Poly-ADP-Ribose Polymerase: 6-Amino-1,2-Benzopyrone,

91 5P

PERSONAL AUTHORS: Kirsten, Eva; Bauer, Pal I.; Kun, Ernest

CONTRACT NO. AFOSR-89-0231

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0606, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Experimental Cell Research, v193 p1-4 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The cellular inhibitory effects of 6-amino-1,2-benzo-pyrone (6-ABP), a DNA site-specific ligand of adenosine diphosphoribisoyl transferase (ADPRT), were determined in a dexamethasone-sensitive EJ-ras gene construct containing cell line (14C cells). Dexamethasone in vitro transforms these cells to a tumorigenic phenotype and also stimulates cell replication. At a nontoxic concentration (0.2 mM) 6-ABP treatment of intact cells for 4 days inhibits the dexamethasone stimulated increment of cellular DNA content, depresses replicative DNA synthesis as assayed by thymidine incorporation to the level of cells that were not exposed to dexamethasone, and in permeabilized cells reduces the dexamethasone-stimulated increase of deoxyribonucleotide incorporation into DNA to the level of untreated cells.

DESCRIPTORS: (U) , ADENOSINE, BIOSYNTHESIS, CELLS, CELLS(BIOLOGY), DEOXYRIBONUCLEIC ACIDS, INHIBITION, RATS, TRANSFERASES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 605 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A238 604 7/4

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) N,N'-Bis(triethylaluminio)ethylenediamine- and N,N'-Bis(trimethylaluminio)ethylenediamine-Derived Organometallic Precursors to Aluminum Nitride: Syntheses, Structures, and Pyrolyses.

90 9P

PERSONAL AUTHORS: Jiang, Zhiping; Interrante, L. V.

CONTRACT NO. AFOSR-89-0439

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0825, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemistry of Materials, v2 n4 p439-446 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The reactions of triethylaluminum or trimethylaminum with ethylenediamine (en) in a 2:1 molar ratio have been studied. Pyrolysis of the initially formed adducts under nitrogen yields polymeric amides and imides. Evidence was also obtained for the formation of novel en-chelated organoaluminum intermediates during the conversion of the adducts to the amides. The structures and properties of the adducts, as well as their pyrolysis products, have been studied with 1H and 13C NMR, FT-IR, GC, DSC, TGA, elemental analysis, and XRD methods. AlN powder has been obtained by the pyrolysis of the imides at 1000 C in NH3. Preliminary studies were also carried out on the fabrication of AlN thin films on Si substrates by solution coating, using a solution of the bis(diethylauminio)ethylenediamine in benzene, followed by pyrolysis under NH3.

DESCRIPTORS: (U) , ALUMINUM COMPOUNDS, AMIDES, BENZENE, COATINGS, ETHYLENEDIAMINE, IMIDES, NITRIDES, NITROGEN, POLYMERS, PYROLYSIS, SOLUTIONS(GENERAL), SUBSTRATES, TRIETHYLALUMINUM, YIELD.

AD-A238 605

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 604 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, *Aluminum nitride, *Organometallic precursor, Ethylenedramine AlN coating.

AD-A238 602 11/6

EPIR LTD OAKBROOK IL

(U) Evaluation of the Feasibility and the Cost of HgCdTe Epitaxial Layers Grown by Molecular Beam Epitaxy on CdTe, CdZnTe and GaAs Substrates.

DESCRIPTIVE NOTE: Final rept. 15 Jul 90-14 Jan 91,

JAN 91 19P

PERSONAL AUTHORS: Faurie, Jean-Pierre

CONTRACT NO. F49620-90-C-0062

MONITOR: AFOSR, XF
TR-91-0578, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this contract which has been awarded to EPIR Ltd. two tasks were assigned. The first one was related to the evaluation of the cost Mercury Cadmium Tellurium epitaxial layers grown by Molecular Beam Epitaxy (MBE) on various substrates. The substrates which were supposed to be considered are Cadmium Telluride, CdZnTe and Gallium Arsenic In addition, EPIR has also analyzed the cost on silicon substrates since Si is currently considered to be the most important substrates for IR photodiode technology. The second task was related to the feasibility of growing a few HgCdTe epilayers by MDE with at least one exhibiting standard specifications.

DESCRIPTORS: (U) , CADMIUM TELLURIDES, COSTS, EPITAXIAL GROWTH, FEASIBILITY STUDIES, GALLIUM, GALLIUM ARSENIDES, GROWTH(GENERAL), LAYERS, MERCURY COMPOUNDS, MILITARY FACILITIES, MOLECULAR BEAMS, ORDNANCE, PHOTODIODES, SILICON, SPECIFICATIONS, SUBSTRATES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 601 12/4

STATE UNIV OF NEW YORK AT ALBANY DEPT OF COMPUTER SCIENCE

(U) A Workshop on the Integration of Numerical and Symbolic Computing Methods Held in Saratoga Springs, New York on July 9-11, 1990.

DESCRIPTIVE NOTE: Final rept. May 90-Apr 91,

APR 91 10P

PERSONAL AUTHORS: Kapur, Deepak

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0556, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A workshop on the integration of symbolic and numerical computing methods was held on July 9 to 11, 1990 in Saratoga Springs, New York. The workshop was supported by a grant from the Air Force Office of Scientific Research and the National Science Foundation along with partial funding from G.E. Corporate Research and Development, and the State University of New York at Albany. The workshop was hosted by the Institute of Programming and Logics, the State University of New York at Albany. Twenty five research papers on symbolic methods, numerical methods, interface between symbolic and numerical methods, applications of symbolics methods in machine vision, robotics, computer aided design, computational geometry, and related topics were presented. Over forty researchers and students participated in the workshop.

DESCRIPTORS: (U) , COMPUTATIONS, COMPUTER AIDED DESIGN, CORPORATIONS, GEOMETRY, INTEGRATION, LOGIC, NEW YORK, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, ROBOTICS, STUDENTS, SYMBOLS, WORKSHOPS.

IDENTIFIERS: (U) *Computations, *Mathematical models, Workshop, PE61102F, WUAFOSR2304A2.

AD-A238 574 25/5

RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ

(U) Feasibility Study of Developing a Meaningful and Implementable Methodology for Assessing JTC3A Effectiveness.

DESCRIPTIVE NOTE: Final rept. 1 Jun 90-1 Jan 91,

DEC 90 31P

PERSONAL AUTHORS: Avi-Itzhak, Benjamin; Hansen, Pierre

CONTRACT NO. AFOSR-90-0291

PROJECT NO. 2581

TASK NO. 00

MONITOR: AFOSR, XF
TR-91-0858, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *COMMAND AND CONTROL SYSTEMS, FEASIBILITY STUDIES, COMMAND GUIDANCE, LOGISTICS, FEDERAL BUDGETS, MILITARY REQUIREMENTS.

IDENTIFIERS: (U) WUAFOSR258100, PE28045K.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 573 8/5

GEORGIA UNIV ATHENS DEPT OF PHARMACOLOGY AND TOXICOLOGY

(U) Bioavailability of Volatile Organics and Other Hydrocarbons from Environmental Media: Ingestion in Drinking Water.

DESCRIPTIVE NOTE: Annual rept. no. 2, 15 Sep 89-14 Nov 90,

NOV 90 14P

PERSONAL AUTHORS: Bruckner, J. V.; Manning, R. O.; Gallo, J. M.; Dallas, C. E.

CONTRACT NO. AFOSR-88-0277

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0660, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary objectives of this project are to: (1) assess the roles of hepatic and pulmonary presystemic elimination in reducing the bioavailability of low levels of volatile organic chemicals (VOCs) found in drinking water supplies; (2) investigate gastrointestinal (GI) absorption pathways for VOCs; (3) characterize the influence of oil dosage vehicles on the absorption, pharmacokinetics (PK) and toxicity of VOCs, with emphasis on potential mechanisms by which corn oil acts. Substantial progress has been made during the first 2 years of the grant towards achieving each each of these objectives. Studies in unanesthetized, freely-moving rats, contrasting the PK of equal doses of VOCs given orally as a single bolus and by constant intragastric (ig) infusion for up to 6 hours, revealed significantly lower peak blood levels and bioavailability in the ig groups. Blood concentrations of well metabolized VOCs, such as trichloroethylene (TCE) and 1,1-dichloroethylene, were so low that they were hardly detectable at low dosage levels in the ig animals.

DESCRIPTORS: (U) , ABSORPTION, ANIMALS, BLOOD, BLOOD VOLUME, CHEMICALS, CONCENTRATION(CHEMISTRY), CORN, DOSAGE, DRINKING WATER, ENVIRONMENTS, HYDROCARBONS,

AD-A238 573

AD-A238 573 CONTINUED

LEVEL(QUANTITY), LOW LEVEL, MEDIA, OILS, ORGANIC MATERIALS, PEAK VALUES, TOXICITY, TRICHLOROETHYLENE, VEHICLES, VOLATILITY, WATER SUPPLIES.

IDENTIFIERS: (U) WUAFOSR2312A4, PE61102F, Absorption, *Metabolism, Bioavailability, Pharmacokinetics, Hepatic elimination, Pulmonary elimination, Volatile organic chemicals (VOCs), Dosage vehicles, *Drinking water.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 322 12/3

COMPUTATIONAL MECHANICS CO INC AUSTIN TX

(U) Non-Algorithmic Issues in Automated Computational Mechanics.

DESCRIPTIVE NOTE: Final rept. 1 Mar 89-18 Feb 91,

APR 91 180P

PERSONAL AUTHORS: Tworzydlo, W. W.; Oden, J. T.; Bass, J. M.; Combs, J.; Sheikh, S.

REPORT NO. TR-91-09

CONTRACT NO. F49620-89-C-0015

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-91-0603

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC reproductions will be in black and white.

ABSTRACT: (U) The general goal of the project was to study the feasibility of the development of an automatic environment for engineering design of aerospace structures, in particular for their analysis by the finite element method. Of particular interest were non-algorithmic issues related to automated decision making based on heuristics and expertise. In the first phase of work, the types of knowledge and decisions involved in the design process were studied, and computer technologies best suited for their automation were evaluated. These technologies include algorithmic procedures, knowledge based expert systems, neural networks, knowledge acquisition systems, etc. The main thrust of research in the project was focused on the development and extension of concepts related to automated computational mechanics, such as adaptive computational techniques, automated model and strategy selection, automated performance monitoring and quality assurance for the finite element analysis. These methods were implemented in an automated computational

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AD-A238 322 CONTINUED

environment, based on full coupling of h-p adaptive finite element program with expert systems technology. Several examples of automated decision making in finite element analysis prove the feasibility and great practical potential of automated environments for design of aerospace structures. Based on the studies performed in the project, directions of further research and development in this area were identified.

DESCRIPTORS: (U) , ADAPTIVE SYSTEMS, AEROSPACE CRAFT, ALGORITHMS, AUTOMATIC, AUTOMATION, COMPUTATIONS, COMPUTERS, COUPLING(INTERACTION), DECISION MAKING, ENGINEERING, ENVIRONMENTS, EXPERT SYSTEMS, FEASIBILITY STUDIES, FINITE ELEMENT ANALYSIS, HEURISTIC METHODS, KNOWLEDGE BASED SYSTEMS, MECHANICS, MODELS, MONITORING, QUALITY ASSURANCE, SELECTION, STRATEGY.

IDENTIFIERS: (U) WUAFOSR2302B1, PE61102F, *Statistical mechanics, *Computations.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 289 11/4

CENTER FOR ADVANCED CEMENT-BASED MATERIALS EVANSTON IL

(U) Workshop Proceedings: Toughening Mechanisms in Quasi-Brittle Materials Held on 16-20 July 1990 in Evanston, Illinois.

DESCRIPTIVE NOTE: Final rept.15 Jul-1 Nov 90,

MAY 91 569P

PERSONAL AUTHORS: Shah, Surendra P.

CONTRACT NO. AFOSR-90-0290

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR, XF
TR-91-0546, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Recently, considerable interest has been developing in understanding and modeling the fracture processes in these quasi-brittle materials as well as in designing materials with improved toughness. The research activities in these groups of materials: ceramics, cement and rock can be substantially enhanced with the exchange of information between these three groups of investigators. Since the field is relatively new, it is likely that the researchers working with one set of materials are not aware of similar developments with other set of materials. Although each material has its own set of specific characteristics, many common aspects can be shared among these quasi-brittle materials. These include: (1) application of nonlinear fracture mechanics, (2) experimental and theoretical considerations of strain localization, (3) microscopic observation of fracture process zone, (4) nondestructive evaluation of damage, (5) models to relate microstructure with macroscopic response, and (6) development of experimental and theoretical tools. The purpose of this workshop was to bring together researchers addressing the problem of fracture in cement, ceramics, and rock so that they can share their knowledge and develop a more general syntheses of the problem.

DESCRIPTORS: (U) , BRITTLENESS, CEMENTS, CERAMIC

AD-A238 289

AD-A238 289 CONTINUED

MATERIALS, DAMAGE, FRACTURE(MECHANICS), ILLINOIS, INFORMATION EXCHANGE, MATERIALS, MICROSCOPY, MICROSTRUCTURE, NONDESTRUCTIVE TESTING, NONLINEAR ANALYSIS, OBSERVATION, THEORY, TOUGHNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C2.

IAC NO. NT-45048

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U) CEMENTS, CERAMIC MATERIALS, ROCKS, FRACTURE MECHANICS, BRITTLENESS, ELASTIC WAVES, WAVE VELOCITY, ACOUSTIC EMISSIONS, HOLOGRAPHY, INTERFEROMETRIC HOLOGRAPHY, TEST METHODS, TOUGHNESS.;

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 262 12/1 17/9 20/14

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Numerical Methods for Scattering from Electrically Large Objects.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 Mar 91,

MAY 91 92P

PERSONAL AUTHORS: Enguist, Bjorn; Murphy, W. D.; Rokhlin, Vladimir; Vassiliou, Marius S.

REPORT NO. SC71004.FR

CONTRACT NO. F49620-89-C-0048

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0612, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A new and computationally very efficient integral equation numerical method for computing electromagnetic scattering and Radar Cross Section (RCS) was developed. A theory of higher order impedance boundary conditions was derived to handle single and multiple dielectric coatings around conductors. The method was tested in two dimensions using a 14,000-line FORTRAN program and was found to be very promising for electrically large objects. Initial ideas for extensions to three dimensions were explored. Treatments of trailing edge and corner singularities were developed.

DESCRIPTORS: (U) , ADAPTERS, ELECTRICAL PROPERTIES, ELECTROMAGNETIC SCATTERING, NUMERICAL METHODS AND PROCEDURES, RADAR CROSS SECTIONS, SCATTERING, TRAILING EDGES.

IDENTIFIERS: (U) *Integral equations, *Computations, *Radar cross sections, *Electromagnetic scattering, WUAFORR2304A9, PE61102F.

AD-A238 261 8/7

NATIONAL RESEARCH COUNCIL WASHINGTON DC COMMISSION ON ENGINEERING AND TECHNIC AL SYSTEMS

(U) The Geotechnical Board, National Research Council Activities Report.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-28 Feb 91,

MAY 91 9P

PERSONAL AUTHORS: Smeallie, Peter

CONTRACT NO. AFOSR-89-0347

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR, XF
TR-91-0564, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers the activities of the Geotechnical Board and its two national, committees, the US National Committee for Rock Mechanics (USNC/RM) and the US National Committee on Tunneling Technology (USNC/TT).

DESCRIPTORS: (U) , ROCK MECHANICS, TUNNELING.

IDENTIFIERS: (U) *Engineering geology, Advisory activities, WUAFOSR2302C1, PE61102F.

AD-A238 260 7/4

OREGON STATE UNIV CORVALLIS DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Atomic Approaches to Defect Thermochemistry.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 90-31 Mar 91,

APR 91 15P

PERSONAL AUTHORS: Van Vechten, James A.; Wager, John F.

CONTRACT NO. AFOSR-89-0309

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0574, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the research program described herein was to apply atomistic thermodynamic theory, Monte Carlo simulation, and experimental analysis to elucidate the identity of point defects in semiconductors as well as to understand their static and dynamic properties. Significant progress has been made in the following nine areas: (1) Direct simulation of atomic diffusion including the effects of realistic boundary conditions, carrier injection and mis-fit strain, (2) Independent measurement of vacancy concentration and diffusivity, (3) Effects of temperature and strain on band offsets and atomic diffusion, (4) Elimination of DX centers from AlGaAs by optically stimulated dislocation climb, (5) Proper analysis of the capacitance-transient due to multiple carrier emission from a highly compensating deep level, (6) C-V analysis and SPICE modeling of ACTFEL devices, (7) DX in AlGaAs, (8) Statistical thermodynamics of ballistic hopping, and (9) Energetics of self-diffusion in GaAs.

DESCRIPTORS: (U) , ATOMIC PROPERTIES, BOUNDARIES, COMPENSATION, DIFFUSION, DIFFUSION COEFFICIENT, DYNAMICS, EMISSION, ENERGETIC PROPERTIES, INJECTION, MEASUREMENT, MONTE CARLO METHOD, SEMICONDUCTORS, SIMULATION, STATISTICS, THEORY, THERMOCHEMISTRY, THERMODYNAMICS.

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IDENTIFIERS: (U) WUAFOSR2306B1, PE61102F.

AD-A238 260

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 256 12/3

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) A Hierarchical, Combinatorial-Markov Method of Solving Complex Reliability Models,

88 11P

PERSONAL AUTHORS: Sahner, Robin A.; Trivedi, Kisbor S.

CONTRACT NO. AFOSR-84-0132

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-0984

UNCLASSIFIED REPORT

Availability: Pub. in Proc ACM/IEEE Fall Joint Computer Conference, Dallas, TX 1988 p 817-825. Available only to DTIC users. No copies furnished by NTIS. Document partially illegible.

Reprint: A Hierachical, Combinatorial-Markov Method of Solving Complex Reliability Models.

DESCRIPTORS: (U) *COMBINATORIAL ANALYSIS, *MATHEMATICAL MODELS, *MARKOV PROCESSES, REPRINTS.

IDENTIFIERS: (U) SHARPE(Symbolic Hierarchical Automated Reliability and Performance Evaluation), WUAFOSR2304A5, PE61102F..

AD-A238 235 6/4 5/8

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF BRAIN AND COGNITIVE SCIENCES

(U) Top-Down Influences on Bottom-Up Processing.

DESCRIPTIVE NOTE: Annual rept. Sep 89-May 91,

MAY 91 6P

PERSONAL AUTHORS: Richards, Whitman

CONTRACT NO. AFOSR-89-0504

PROJECT NO. 2313

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0597, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Over the past year and one-half, our research effort can be broken down into four categories: (1) A formal framework for percepts; (2) A logic for reasoning about percepts; (3) Experiments related to the above; and (4) Seeking chaos in high-level visual processing.

DESCRIPTORS: (U) , REASONING.

IDENTIFIERS: (U) *Vision, *Cognition, Neurophysiology, Visual psychophysics, Dynamical systems, Artificial intelligence, PE61102F, WUAFOSR2313A9.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 234 12/5

QUALCOMM INC SAN DIEGO CA

(U) Research in Mathematics and Computer Science: Calculation of the Probability of Undetected Error for Certain Error Detection Codes. Phase 2.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 90-31 May 91,

MAY 91 32P

PERSONAL AUTHORS: Viterbi, Andrew J.; Wolf, Jack K.; Fredrickson, Lyle J.; Levin, Jeff A.; Blakeney, Robert D.

CONTRACT NO. F49620-90-C-0017

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0596, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Cyclic Redundancy Check (CRC) codes have become the standard means for detecting error in messages that have been transmitted over a noisy communications channel. Unfortunately, even the very best CRC codes cannot detect all transmission errors. In this report,we first describes a hardware device capable of evaluating the random error performance of an important class of CRC codes that are generated by polynomials of the form g(x) = (x+1) p(x), where p(x) is a primitive polynomial of degree (R-1). We then introduce a new burst error model and establish an equivalence between the burst and random error performance of cyclic codes. From this, we can extend the random error test results obtained from the hardware device to include burst errors. Also included in this report is an intuitive look at the factors which lead to good code performance, and an overview of a supplemental hardware device to measure the performance of cyclic codes that are generated by arbitrary polynomials.

DESCRIPTORS: (U) , BURST TRANSMISSION, CODING, COMPUTATIONS, COMPUTERS, ERROR DETECTION CODES, ERRORS, MATHEMATICS, MEASUREMENT, MODELS, POLYNOMIALS,

AD-A238 234

AD-A238 234 CONTINUED

PROBABILITY, TEST AND EVALUATION.

IDENTIFIERS: (U) *Error detection codes, *Computer program reliability, PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 233 17/4 12/9 12/4

CALIFORNIA INST OF TECH PASADENA DEPT OF ELECTRICAL ENGINEERING

(U) Coding for Spread-Spectrum Channels in the Presence of Jamming.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 88-30 Sep 90,

SEP 90 5P

PERSONAL AUTHORS: McEliece, Robert J.

CONTRACT NO. AFOSR-88-0247

PROJECT NO. 2304

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0618, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Multi-user communication systems have been studied. There are systems in which many simultaneous two-way conversations have common frequencies. The maximum number of such conversations can be computed by a fairly simple linear program. (Author)

DESCRIPTORS: (U) , CHANNELS, CODING, COMMUNICATION AND RADIO SYSTEMS, FREQUENCY, JAMMING, LINEAR PROGRAMMING, SPREAD SPECTRUM, USER NEEDS.

IDENTIFIERS: (U) *Spread spectrum techniques, *Jamming, *Game theory, Noise, Fading, PE61102F, WUAFOSR2304B1.

AD-A238 232 6/5

MEHARRY MEDICAL COLL NASHVILLE TN

(U) Transformation and Precipitation of Toxic Metals by 'Pseudomonas maltophilia'.

DESCRIPTIVE NOTE: Annual technical rept. 1 May 90-30 Apr 91,

MAY 91 8P

PERSONAL AUTHORS: Blake, Robert, III

CONTRACT NO. F49620-89-C-0052

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0605, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aims of this research are to study each of the various molecular mechanisms whereby toxic metal cations and oxyanions are chemically transformed by Pseudomonas maltophilia strain OR-02. The research effort for the current year has focused on the microbial-dependent transformations of mercury, selenium, tellurium, chromium and lead. The NADPH-dependent reduction of Hg(II) was catalyzed by an inducible mercuric reductase. The reduction of selenite and tellurite to their insoluble elemental forms was mediated by an intracellular glutathione reductase that utilized the spontaneously-formed bis(gluthathio)Se(II) or bis(gluthathio)Te(II), respectively, as pseudosubstrates.

DESCRIPTORS: (U) , CATIONS, CELLS(BIOLOGY), CHROMIUM, ENZYMES, GLUTATHIONE, MERCURY, METALS, MOLECULAR PROPERTIES, PRECIPITATION, SELENIUM, TELLURIUM, TOXICITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 231 20/10 20/5

MARYLAND UNIV COLLEGE PARK INST FOR PHYSICAL SCIENCE AND TECHNOLOGY

(U) Laser-Atom Interaction at High Intensities.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-31 Dec 90,

MAY 91 7P

PERSONAL AUTHORS: McIlrath, T. J.; Clark, C. W.

CONTRACT NO. AFOSR-88-0098

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0593, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A general program has been developed to calculate multiphoton processes in atomic hydrogen to arbitrarily high order in perturbation theory. This program can be used to calculate quantities in intense field multiphoton processes, such as the generalized cross section of multiphoton absorption, the a.c. Stark effect (shift and the broadening of the level due to the field interaction), and the parameters in nonlinear optics such as the nonlinear index of refraction and the nonlinear susceptibility. Effective parametrization of high-order susceptibilities has been achieved over a wide range of frequencies, utilizing concepts from quantum defect theory to express the results of lengthy calculations in a compact form that also permits extrapolation across thresholds and resonance poles. Significant progress has been made in direct numerical solution of the time-dependent Schroedinger equation. In addition, contributions have been made in: understanding the role of spatial dimensionality in the solution of model systems (e.G., the one-dimensional delta-function potential); the development of a general R-matrix code for perturbative computations of multiphoton processes in many-electron atoms; and multiphoton ionization with two commensurate laser frequencies.

DESCRIPTORS: (U) , ABSORPTION, ATOMIC STRUCTURE,

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COMPUTATIONS, CROSS SECTIONS, DEFECT ANALYSIS, ELECTROMAGNETIC SUSCEPTIBILITY, FREQUENCY, HIGH RATE, HYDROGEN, INTENSITY, INTERACTIONS, LASERS, MODELS, NONLINEAR OPTICS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, PERTURBATION THEORY, PHOTOIONIZATION, PHOTONS, POLES(SUPPORTS), QUANTUM EFFICIENCY, QUANTUM THEORY, RANGE(EXTREMES), REFRACTIVE INDEX, RESONANCE, SCHRODINGER EQUATION, SOLUTIONS(GENERAL), TIME DEPENDENCE.

IDENTIFIERS: (U) *Laser target interactions, *Perturbation theory, Multiphoton processer, PE61102F, WUAFOSR2301A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 230 6/5

TRINITY UNIV SAN ANTONIO TX DEPT OF BIOLOGY

(U) Image Analysis of Viral-Expressing Mouse Macrophage Cells.

DESCRIPTIVE NOTE: Final rept. 1 Jul 90-31 Mar 91,

MAY 91 13P

PERSONAL AUTHORS: Blystone, Robert V.

CONTRACT NO. AFOSR-90-0287

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0592, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) RAW 264.7 mouse macrophage cells have interesting growth properties. To best utilize these cells in research protocols, rapid and inexpensive monitoring of in situ growth characteristics are necessary. An inexpensive computer imaging and visualization system was assembled to complement the microscopical analysis if in situ cells. Data for image analysis was provided by a combination of optically scanned cell cultures, framed-grabbed light microscopy, and optically scanned scanning and transmission micrographs of in situ cell cultures. The imaging system proved to be quite rapid. Several elements concerning RAW cell growth were uncovered including a relationship between cell culture seed concentration and the appearance of foci. However, the mechanism of viral expression is still unclear. The imaging system was successfully adapted for looking at bacterial cultures as well. A low-cost imaging system is now in place for examining in situ cell culture systems of several types.

DESCRIPTORS: (U) , CELLS(BIOLOGY), COMPUTERS, CULTURES(BIOLOGY), GROWTH(GENERAL), IMAGE PROCESSING, IMAGES, LOW COSTS, MICROSCOPY, VIRUSES.

IDENTIFIERS: (U) Image analysis, *Microscopy, Cell culture, Virus, PE61102F, WUAFOSR2312A5.

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ARIZONA UNIV TUCSON DEPT OF SYSTEMS AND INDUSTRIAL ENGINEERING

(U) Heuristic Methods in Applied Probability.

DESCRIPTIVE NOTE: Final rept. 1 Dec 89-30 May 90,

MAY 91 8P

PERSONAL AUTHORS: Higle, Julia L.

CONTRACT NO. AFOSR-88-0078

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0615, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this research program is the development of heuristic and algorithmic approaches to various problems of engineering and applied mathematical interest. This research program was initiated under the guidance of Professor Marcel F. Neuts. Unfortunately, a substantial revision of the project budget required his resignation from the project. Thus, in this report, we will summarize the work of Dr's Julia L. Higle, who investigates problems of stochastic optimization and develops non-accident based measures of vehicular traffic hazards, and Jeffrey B. Goldberg, who investigates problems of design for reliability and manufacturability, decision making in Just-In-Time manufacturing systems, and approximation models for spatially distributed queueing systems. These investigators and the students supported during the final year of this grant work in quite diverse areas, but share a strong interest in algorithmic methodology.

DESCRIPTORS: (U) , ALGORITHMS, BUDGETS, DECISION MAKING, DISTRIBUTION, ENGINEERING, HAZARDS, HEURISTIC METHODS, METHODOLOGY, MODELS, OPTIMIZATION, PROBABILITY, QUEUEING THEORY, RELIABILITY, STOCHASTIC PROCESSES, STUDENTS, TRAFFIC, VEHICLES.

IDENTIFIERS: (U) *Heuristic methods, *Algorithms,

AD-A238 229

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*Applied mathematics, PE61102F, WUAFOSR2304A5.

AD-A238 209 7/3 7/1 11/2

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Effects of Ring Substituents, Preferential Solvation, and Added Amine on the Trimer-Dimer Equilibrium in Cyclic Dialkylaluminum Amide Compounds,

90 6P

PERSONAL AUTHORS: Sauls, Frederick C.; Czekaj, Corinna L.; Interrante, Leonard V.

CONTRACT NO. AFOSR-89-0439

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0629, AFOSR

UNCLASSIFIED REPORT

Availability: *Pub. in Inorganic Chemistry*, v29 n23 p4688-4692 1990. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Effects of Ring Substituents, Preferential Solvation, and Added Amine on the Trimer-Dimer Equilibrium in Cyclic Dialkylaluminum Amide Compounds.

DESCRIPTORS: (U) *AMIDES, *ORGANOMETALLIC COMPOUNDS, *ALUMINUM COMPOUNDS, *CHEMICAL EQUILIBRIUM, CERAMIC MATERIALS, NITRIDES, CYCLIC COMPOUNDS, SOLVATION, AMINES, DIMERS, NUCLEAR MAGNETIC RESONANCE, PYROLYSIS, REPRINTS.

IDENTIFIERS: (U) Aluminum nitride, Dialklylaluminum amide, Trimers, PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 208 7/3 7/1 11/2

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Synthesis, Structure, and Pyrolysis of Organoaluminum Amides Derived from the Reactions of Trialkylaluminum Compounds with Ethylenediamine in a 3:2 Ratio.

91 7P

PERSONAL AUTHORS: Jiang, Zhiping; Interrante, Leonard V.; Kwon, Daekeun; Tham, Fook S.; Kullnig, Rudolph

CONTRACT NO. AFOSR-89-0439

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0624, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorganic Chemistry, v30 n5 p995-1000 1991. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Synthesis, Structure, and Pyrolysis of Organoaluminum Amides Derived from the Reactions of Trialkylaluminum Compounds with Ethylenediamine in a 3:2 Ratio.

DESCRIPTORS: (U) *AMIDES, *ORGANOMETALLIC COMPOUNDS, *ALUMINUM COMPOUNDS, *SYNTHESIS(CHEMISTRY), MOLECULAR STRUCTURE, PYROLYSIS, CERAMIC MATERIALS, NITRIDES, ETHYLENEDIAMINE, REPRINTS.

IDENTIFIERS: (U) Aluminum nitride, PE61102F, WUAFOSR2303A3.

AD-A238 207 7/5 7/4

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Investigation of the Kinetic Window for Generation of 13C t(0)-S CIDNP Derived from Long-Chain Biradicals by Tuning the Rates of Bimolecular Scavenging and Intersystem Crossing.

91 5P

PERSONAL AUTHORS: Hwang, Kuo C.; Turro, Nicholas J.; Doubleday, Charles, Jr

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0630, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the American Chemical Society, v113 p2850-2853 1991. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Investigation of the Kinetic Window for Generation of 13C T(0)-S CIDNP Derived from Long-Chain Biradicals by Tuning the Rates of Bimolecular Scavenging and Intersystem Crossing.

DESCRIPTORS: (U) *CYCLOALKANES, *CHEMICAL RADICALS, *NUCLEAR SPINS, *POLARIZATION, *PHOTOLYSIS, REACTION KINETICS, MOLECULAR ORBITALS, COUPLING(INTERACTION), REPRINTS, PHENYL RADICALS.

IDENTIFIERS: (U) Phenycycloalkanes, CIDNP(Chemically Induced Dynamic Nuclear Polarization), *Nucler polarization, Scavengers(Chemistry), Carbon 13, Crossing, Spin orbit coupling, PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 206 7/5 7/4

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Photoelectron Transfer between Molecules Adsorbed in Restricted Spaces,

91 11P

PERSONAL AUTHORS: Turro, Nicholas J.; Barton, Jacqueline K.; Tomalia, Donald

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0627, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Photochemical Conversion and Storage of Solar Energy, p121-139 1991. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Photoelectron Transfer between Molecules Adsorbed in Restricted Spaces.

DESCRIPTORS: (U) *METAL COMPLEXES, *PHOTOELECTRONS, *ELECTRON TRANSFER, ADSORPTION, ANIONS, SURFACES, DEOXYRIBONUCLEIC ACIDS, POLYELECTROLYTES, RUTHENIUM, PYRIDINES, COBALT, METHYL RADICALS, REPRINTS.

IDENTIFIERS: (U) Methyl viologens, PE61102F, WUAFOSR2303B2.

AD-A238 205 7/4 7/5 7/3

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Diastereoselective Induction in Radical Coupling Reactions: Photolysis of 2,4-diphenylpentan-3-ones Adsorbed on Faujasite Zeolites,

91 14P

PERSONAL AUTHORS: Ghatlia, Naresh D.; Turro, Nicholas J.

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0628, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Photochemistry and *Photobiology A: Chemistry*, v57 p7-19 1991. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Diastereoselective Induction in Radical Coupling Reactions: Photolysis of 2,4-diphenylpentan-3-ones Adsorbed on Faujasite Zeolites.

DESCRIPTORS: (U) *PENTANONES, *ISOMERS, *PHOTOLYSIS, ADSORPTION, ION EXCHANGE RESINS, STEREOCHEMISTRY, LITHIUM, SODIUM, BUTANES, PHENYL RADICALS, REPRINTS.

IDENTIFIERS: (U) Zeolites, Diatereoselectivity, Faujasites, Diphenylpentanones, PE61102F, WUAFOSR2303B2.

AD-A238 158 8/10

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING

(U) A Study of the Behavior and Micromechanical Modelling of Granular Soil. Volume 3. A Numerical Investigation of the Behavior of Granular Media Using Nonlinear Discrete Element Simulation.

DESCRIPTIVE NOTE: Final rept. 6 Jan 89-15 May 91,

MAY 91 46P

PERSONAL AUTHORS: Petrakis, Emmanuel; Dobry, Ricardo; Ng, Tang-Tag; Liu, Li

CONTRACT NO. AFOSR-89-0350

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-91-0621

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A238 091.

ABSTRACT: (U) Nonlinear discrete element simulations were used to provide an insight on the nonlinear modelling of granular soil. These simulations were based on an incremental solution to the nonlinear problem of two spheres in contact, incorporated into discrete element TRUBAL which was further optimized for vector and parallel processing on the IBM 3090 supercomputer. It was found that this approach not only interprets successfully nonlinear behavior of soil, but also provides a wealth of information on the fabric changes during the loading. The yield surface of a granular medium, needed for defining the constitutive relation of such a medium, distorts by forming an apex in the direction of loading while becoming flatter in the opposite direction. This contrary to the practice followed in modelling granular media where the yield surface of soils are typically assumed to retain the same shape. Origin of this distortion phenomenon lies in the texturing (or fabric anisotropy) which occurs in the direction of prestraining, as well as in the redistribution of interparticle contact forces in

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the absence of significant particle movement during the small strain probes needed to define the yield surface. These phenomena cause certain slip systems to be activated which produce the characteristic apex which appear in the yield surface in the loading direction. Therefore, distribution and magnitude of the contact forces are critical for a good understanding of the macroscopic response of the medium. Accurate modelling of the contact force distribution can be achieved only if the behavior at the contact is fully understood and rigorously modelled.

DESCRIPTORS: (U) , ANISOTROPY, BEHAVIOR, DISTORTION, DISTRIBUTION, FABRICS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, PARALLEL PROCESSING, PARTICLES, SIMULATION, SOILS, SOLUTIONS(GENERAL), SPHERES, SURFACES, VECTOR ANALYSIS, YIELD.

IDENTIFIERS: (U) *Soil mechanics, *Soil models, Granules, Stress strain relations, Computerized simulation, Elastoplasticity, Granular soils, Loads(Forces), Constitutive models, Aggregated soils, Polycrystalline, Nonlinear analysis, Soil fabrics, Unloading, Anisotropy, Discrete element method, WUAFOSR2302C1, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 151 11/8.1 11/8.2 21/5

CALIFORNIA UNIV BERKELEY DEPT OF MATERIALS SCIENCE AND MINERAL ENGINEERING

(U) Micromechanisms of Monotonic and Cyclic Subcritical Crack Growth in Advanced High Melting Point Low-Ductility Intermetallics.

DESCRIPTIVE NOTE: Annual rept. no. 1, 15 Apr 90-14 Apr 91,

MAY 91 49P

PERSONAL AUTHORS: Rao, K. T.; Murugesh, L.; DeJonghe, L. C.

REPORT NO. UCB/R/91/A1072

CONTRACT NO. AFOSR-90-0187

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0578, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The next generation of high-performance jet engines will require markedly stiffer materials, operating at higher stress levels and capable of withstanding temperatures of up to 1650 deg C. Prime candidates for such applications include ordered intermetallics, ceramics and composites based on metal, intermetallic and ceramic or carbon matrices, all of which are currently of limited use due to their low ductility and fracture properties. Moreover, there is a lack of fundamental understanding on the micromechanisms influencing crack growth in these materials, particularly intermetallics. Accordingly, the present study is aimed at exploring the potential of intermetallic alloys and their composites as advanced structural materials by identifying the critical factors influencing the crack-propagation resistance under monotonic and cyclic loads. Attention is focused on the Nb3Al and TiAl intermetallic systems. In both cases, the principal mechanism of toughening is to impede crack advance from crack bridging by ductile second phase particles. Reactive sintering and vacuum hot pressing techniques are successful is

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processing Nb3Al intermetallics and duplex Nb/Nb3Al microstructure with a stringy niobium phase can be achieved through thermal treatments. Characterization of mechanical properties will commence in the second year.

DESCRIPTORS: (U) , BRIDGES, CERAMIC MATERIALS, COMPOSITE MATERIALS, CONSTRUCTION MATERIALS, CRACK PROPAGATION, CRACKS, DUCTILITY, FRACTURE(MECHANICS), HEAT TREATMENT, HOT PRESSING, INTERMETALLIC COMPOUNDS, JET ENGINES, MECHANICAL PROPERTIES, METALS, NIOBIUM, PARTICLES, PERFORMANCE(ENGINEERING), RATES, REACTIVITIES, RESISTANCE, SINTERING, STRESSES, VACUUM.

IDENTIFIERS: (U) *Intermetallic compounds, *Crack propagation, Microstructure, Jet engines, Fracture(Mechanics), Fatigue(Mechanics), Toughness, Monotonic loading, Aluminum, Titanium, WUAFOSR2306A1, PE61102A.

IAC NO. MMC-703387

IAC DOCUMENT TYPE: MMCIAC - HARD COPY --

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 149 20/12 20/10

ARIZONA STATE UNIV TEMPE DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Spatial Light Modulators with Arbitrary Quantum Well Profiles.

DESCRIPTIVE NOTE: Annual technical rept. 14 Jan 90-14 Jan 91,

JAN 91 21P

PERSONAL AUTHORS: Maracas, George N.; Bajaj, Krishan K.

CONTRACT NO. AFOSR-90-0118

PROJECT NO. 3484

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0570, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The program has successfully grown GaAs/A/GaAs triangular and parabolic compositionally graded wells by solid source (SS) Molecular Beam Epitaxy (MBE) and gas source (GS) molecular beam epitaxy (GSMBE). In addition, strained in GaAs/GaAs wells have also been grown. An optimization of growth conditions for obtaining narrow exciton linewidths in square and nonrectangular wells was completed. We have refined the superlattice compositional grading technique to obtain 3 meV photoluminescence linewidths in a triangular quantum well. A study of the optical properties has begun in which the structures are characterized by room temperature and 2K photoluminescence and photocurrent spectroscopies. Responsivity curves for structures having various well shapes have shown the excited states and a comparison with theory is in progress. A preliminary comparison of contrast ratios in rectangular and triangular SEED devices has been completed. Calculations of exciton transition energies, oscillator strength and modulator absorption ratios have successfully been performed for quantum wells having different profiles. The behavior of these structures as a function of electric field has also been performed. It was shown theoretically that asymmetric triangular quantum wells exhibit large contrast ratios at low electric fields.

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DESCRIPTORS: (U) , , ABSORPTION, COMPARISON, CONTRAST, CRYSTAL LATTICES, ELECTRIC CURRENT, ELECTRIC FIELDS, ENERGY, ENVIRONMENTS, EPITAXIAL GROWTH, EXCITONS, GALLIUM ARSENIDES, GASES, GROWTH(GENERAL), LIGHT MODULATORS, MODULATORS, MOLECULAR BEAMS, OPTICAL PROPERTIES, OPTIMIZATION, OSCILLATORS, PHOTOELECTRICITY, PROFILES, QUANTUM ELECTRONICS, QUANTUM THEORY, RATIOS, ROOM TEMPERATURE, SHAPE, SOLIDS, SOURCES, SPATIAL DISTRIBUTION, SPECTROSCOPY, STRENGTH(GENERAL), TRANSITIONS.

IDENTIFIERS: (U) *Light modulators, *Quantum wells, Epitaxial growth..

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 095 11/2 9/1

CALIFORNIA UNIV LOS ANGELES DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Preparation and Properties of New Inorganic Glasses and Gel-Derived Solids.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 87-30 Oct 90,

APR 91 38P

PERSONAL AUTHORS: Mackenzie, John D.

CONTRACT NO. AFOSR-88-0066

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0614, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research has been carried out on two families of solids. The first one involves solids made by the sol-gel process and includes composites. The second one involves non-oxide glasses based on fluorides, chalcogenides, and chalcohalides. The structures of oxide gels were studied by x-ray photoelectron spectroscopy, liquid and solid state NMR. A new theory was developed on gel transformations. A number of new composites made by the sol-gel route were examined, including the use of silicon carbide and diamond powder as fillers and some triphasic solids. Many ferroelectric thin films were prepared and their properties measured. An inorganic-organic gel material named ORMOSIL was developed which developed which exhibited rubbery elasticity. The viscosity and viscoelasticity of fluorozirconate glasses and glass fibers have been studied. New chalcohalide glasses were prepared and their optical properties evaluated. Structural information was derived from Raman spectroscopy. The interaction of ultraviolet radiation on chalcogenide fibers was investigated.

DESCRIPTORS: (U) , CHALCOGENS, COMPOSITE MATERIALS, DIAMONDS, ELASTIC PROPERTIES, FLUORIDES, FLUORINE COMPOUNDS, GELS, GLASS, GLASS FIBERS, INORGANIC MATERIALS,

AD-A238 095

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INTERACTIONS, MATERIALS, OPTICAL PROPERTIES, ORGANIC MATERIALS, OXIDES, POWDERS, RAMAN SPECTROSCOPY, RUBBER, SILICON CARBIDES, SOLIDS, STRUCTURAL PROPERTIES, STRUCTURES, THEORY, TRANSFORMATIONS, ULTRAVIOLET RADIATION, VISCOELASTICITY, VISCOSITY, X RAY PHOTOELECTRON SPECTROSCOPY, ZIRCONATES.

IDENTIFIERS: (U) *Glass, *Sol gel, Silica glass, *Thin films, Ferroelectricity, Transducers, Hysteresis loops, Gels, Optical properties, *Ceramic materials, Chalcogenide glass, Chalcohalide glass, PE61102F, WUAFOSR2303A3.

IAC NO. CE--002365

IAC SUBJECT TERMS: B--(O)B--(U)CERAMIC MATERIALS, FERROELECTRIC CERAMICS, TITANATES, LEAD ZIRCONATE TITANATE (PZT), BARIUM TITANATE, POTASSIUM NIOBATE, STRONTIUM BARIUM NIOBATE (SBN), LEAD BARIUM NIOBATE (PBN), SILICA, GLASS FIBERS, THIN FILMS, SUBSTRATES, FERROELECTRIC PROPERTIES, PIEZOELECTRIC CONSTANT, ELECTRICAL CAPACITANCE, ELECTRICAL RESISTANCE, REMANENT POLARIZATION, COERCIVE FORCE, DIELECTRIC LOSS INDEX, FILM THICKNESS, SHRINKAGE, SOL-GEL PROCESSING, XRD;

AD-A238 095

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 092 8/10

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING

(U) A Study of the Behavior and Micromechanical Modelling of Granular Soil. Volume 2. An Experimental Investigation of the Behavior of Granular Media Under Load.

DESCRIPTIVE NOTE: Final rept. 6 Jan 89-15 May 91,

MAY 91 135P

PERSONAL AUTHORS: Petrakis, Emmanuel; Dobry, Ricardo; Van Laak, Paul; Kotsanopoulos, Panos

CONTRACT NO. AFOSR-89-0350

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-91-0820

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, AD-A238 158.

ABSTRACT: (U) A comprehensive research effort was conducted on constitutive and micromechanical modelling of granular soil. This includes: (1) the development of a new constitutive relation for granular media based on the contact law between two spheres; (2) an experimental investigation on the stress-strain response of a glass bead material with 46 monotonic and cyclic experiments on hollow cylinder specimens, most of them constant mean stress tests to measure deviatoric response and behavior of initial and subsequent yield loci; and (3) numerical simulations of the behavior of granular media using the discrete element method. The proposed constitutive law captures a number of key aspects of the observed stress-strain behavior of granular soils, and it predicts well the experiments on glass beads. Novel aspects of the proposed model include yield cones parallel to the failure envelope, and a basic relation between the field of elastoplastic moduli and the elastic constants of the material.

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AD-A238 092 CONTINUED

DESCRIPTORS: (U) , BEADS, BEHAVIOR, CONICAL BODIES, CONSTANTS, CYLINDRICAL BODIES, ELASTIC PROPERTIES, FAILURE, GLASS, GRANULES, MEAN, NUMERICAL ANALYSIS, PLASTIC PROPERTIES, RESPONSE, SOILS, SPHERES, STRESS STRAIN RELATIONS, STRESS TESTING, YIELD.

IDENTIFIERS: (U) *Soil mechanics, Granules, Polycrystalline, *Soil models, Stress strain relations, Yield, Sand, Spheres, Elastoplasticity, Granular soils, Micromechanics, Constitutive models, Aggregated soils, Mathematical prediction, Model tests, Plastic properties, Sliding, Compacting, Packing density, WUAFOSR2302C1, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 091 8/10

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING

(U) A Study of the Behavior and Micromechanical Modelling of Granular Soil. Volume 1. A Constitutive Relation for Granular Materials Based on the Contact Law Between Two Spheres.

DESCRIPTIVE NOTE: Final rept. 6 Jan 89-15 May 91,

MAY 91 82P

PERSONAL AUTHORS: Dobry, Ricardo; Petrakis, Emmanuel

CONTRACT NO. AFOSR-89-0350

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-91-0619

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A238 092.

ABSTRACT: (U) A comprehensive research effort was conducted on constitutive and micromechanical modelling of granular soil. This includes: (1) the development of a new constitutive relation for granular media based on the contact law between two spheres; (2) an experimental investigation on the stress-strain response of a glass bead material with 46 monotonic and cyclic experiments on hollow cylinder specimens, most of them constant mean stress tests to measure deviatoric response and behavior of initial and subsequent yield loci; and (3) numerical simulations of the behavior of granular media using the discrete element method. The proposed constitutive law captures a number of key aspects of the observed stress-strain behavior of granular soils, and it predicts well the experiments on glass beads. Novel aspects of the proposed model include yield cones parallel to the failure envelope, and a basic relation between the field of elastoplastic moduli and the elastic constants of the material.

DESCRIPTORS: (U) , BEADS, BEHAVIOR, CONICAL BODIES,

AD-A238 091

AD-A238 091 CONTINUED

CONSTANTS, CYLINDRICAL BODIES, ELASTIC PROPERTIES, FAILURE, GLASS, GRANULES, MEAN, PLASTIC PROPERTIES, RESPONSE, SOILS, SPHERES, STRESS STRAIN RELATIONS, STRESS TESTING, YIELD.

IDENTIFIERS: (U) WUAFOSR2302C1, PE61102F, *Soil mechanics, Granules, *Soil models, Stress strain relations, Yield, Computer simulation, Elastoplasticity, Granular soils, Micromechanics, Constitutive models, Compressive properties, Mathematical prediction, Model tests, Plastic properties, Isotropism, Anisotropy, Contact law.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 029 13/13 20/11

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

(U) Fission-Fusion Adaptivity in Finite Elements for Nonlinear Dynamics of Shells.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 87-30 Aug 90,

AUG 90 48P

PERSONAL AUTHORS: Belytschko, Ted

CONTRACT NO. F49620-88-C-0011

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0602, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this work was to develop adaptive finite element analysis methods for nonlinear structural dynamics. Adaptive methods are particularly promising for nonlinear problems involving failure, because in failure and near-failure states of structures, three predominant phenomena are; buckling, shear banding, and fracture. These phenomena are associated with localization of the deformation, by which is meant the development of large strains in small regions of the structure, which is accompanied by large gradients in the strain. While strains are distributed in elastic buckling, once plasticity develops a large part of the deformation of beams or shells usually occurs over narrow zone called hingelines. Shear banding is a result of strain softening material behavior and is also associated with narrow bands of highly strained material. In fracture, high strain gradients occur at the crack tip, and in addition the displacement field is discontinuous behind the crack tip. In this work, adaptive methods are developed for the nonlinear dynamics of shells with both geometric and material nonlinearities. The localization phenomenon which is of primary interest in this class of problems is hingeline formation, but aspects of this work should be applicable to other localization phenomena in structural dynamics.

AD-A238 029

AD-A238 029 CONTINUED

DESCRIPTORS: (U) , ADAPTATION, BUCKLING, CRACKS, DEFORMATION, DISPLACEMENT, DYNAMICS, ELASTIC PROPERTIES, FINITE ELEMENT ANALYSIS, GEOMETRY, GRADIENTS, MATERIALS, NARROWBAND, NONLINEAR SYSTEMS, PLASTIC PROPERTIES, REGIONS, SHELLS(STRUCTURAL FORMS), STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) *Shells(structural forms), Hingelines, *Structural mechanics, Stress strain relations, Mesh, Plastic deformation, *Failure(mechanics), Fission, Fusion, PE61102F, WUAFOSR2302B1, Shear strength, Localization.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 028 20/5

YALE UNIV NEW HAVEN CT

(U) Nonlinear Spectroscopy of Multicomponent Droplets and Two- and Three-Dimensional Measurements in Flames.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-31 Jan 91,

MAY 91 24P

PERSONAL AUTHORS: Chang, Richard K.; Long, Marshall B.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0599, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant progress has been made in the following two research areas: (1) Nonlinear spectroscopy of micrometer-size droplets; and (2) Development and application of two- and three- dimensional scalar measurement techniques in flames. In the nonlinear spectroscopy area, the following achievements are reported: (1) Laser-induced shape deformation of transparent droplets by electrostriction, which pushes against the surface tension force and causes the droplet to bulge; (2) Laser-induced shape deformation by heating of absorbing droplets, which were imaged with fluorescence photography; (3) Laser-induced breakdown which quenches the stimulated Raman scattering (SRS); (4) Excitation of SRS with single-mode and multimode Q-switched lasers; and (5) Four-wave mixing processes in droplets, such as third-order sum frequency generation. Achievements in multidimensional scalar imaging include the following: (1) Measurement of the time evolution in premixed H2-air flames using imaging techniques: (2) Development of new techniques for following the time evolution of flow structures in three dimensions; (3) Introduction of a technique for visualizing supersonic flows using Rayleigh scattering from condensed-phase droplets; (4) Measurement of the complete scalar gradient in a nonreacting flow, which allows calculation of the scalar dissipation; (5) Simultaneous CH and CH4 mapping

AD-A238 028

AD-A238 028 CONTINUED

in a turbulent nonpremixed flame, and (6) Investigation of differential diffusion effects.

DESCRIPTORS: (U) , MEASUREMENT, NONLINEAR SYSTEMS, SPECTROSCOPY, THREE DIMENSIONAL.

IDENTIFIERS: (U) Nonlinear spectroscopy, SRS(Stimulated Raman Scattering), *Flames, *Emission spectroscopy, Laser diagnostics, Turbulent flames, Four wave mixing, PE61102F, WUAFOSR2308A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 027 6/5

BAYLOR COLL OF MEDICINE HOUSTON TX

(U) Heterosynaptic Modulation of Long-Term Potentiation at Mossy Fiber Synapses in Hippocampus.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 88-31 Mar 91,

MAY 91 18P

PERSONAL AUTHORS: Johnston, Daniel

CONTRACT NO. AFOSR-88-0142

PROJECT NO 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0598, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of this research project was to investigate the cellular and membrane mechanism associated with heterosynaptic modulation of long-term synaptic potentiation (LTP) at mossy fiber synapses in the hippocampus. Previous work in this laboratory had shown that norepinephrine (NE), through Beta-adrenoceptors, enhances the magnitude, duration, and probability of induction of mossy fiber LTP. We also had preliminary evidence that acetylcholine (ACh), through muscarinic reporters, depresses the magnitude and probability of induction of mossy fiber LTP. We hypothesized that the heterosynaptic modulation of mossy fiber LTP was through modulation of voltage-gated calcium channels. That is, the modulation of LTP by NE results from an enhancement of voltage-gated calcium channels, while suppression of LTP by ACh was through a decrease in activity of voltage-gated calcium channels.

DESCRIPTORS: (U) , ACETYLCHOLINE, CELLS, HIPPOCAMPUS, LONG RANGE(TIME), MEMBRANES, MODULATION, NOREPINEPHRINE.

IDENTIFIERS: (U) *Norepinephrine, Acetylcholine, Synaptic plasticity, Voltage clamp, Patch clamp, Calcium channels, Hippocampus, Mossy fiber, PE61102F, WUAFOSR2312A2.

AD-A238 027

AD-A238 028 8/2 5/8 17/7

MINNESOTA UNIV MINNEAPOLIS INST OF CHILD DEVELOPMENT

(U) Topographic Map Reading.

DESCRIPTIVE NOTE: Final rept. 1 May 88-31 Dec 90,

MAY 91 80P

PERSONAL AUTHORS: Pick, Herbert L., Jr.; Thompson, William B.

CONTRACT NO. AFOSR-88-0187

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0590, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work completed includes a field study and protocol analysis of experienced map readers solving a localization problem. The analysis focused on identifying both the features the map readers attended to and the information processes involved in solving the problem. The information processes identified were reconnaissance, map orientation, feature matching, relation or configuration matching, and hypothesis generation and evaluation. The laboratory simulation studies were conducted on the basis of the field study. They both involved matching a photographic scene to a station point and direction of view on a topographic map. Results of these studies tended to confirm the description of the features and processes from the field study. Two supplementary studies were carried out. One used an alternative laboratory map reading task and provided converging evidence for the effects of manipulation of the amount of information available in the map. The other study was carried out to determine the precision with which map readers could judge physical distance and slope from photographic scenes and maps. This ability would constrain the possibility of using metric information in map reading. Preliminary specification for a computational architecture for the problem solving aspects of the drop-off site problem was completed. The model includes both knowledge bases for features and

AD-A238 028

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 026 CONTINUED

hypothesized solutions as well as a control structure for guiding problem solving activity.

DESCRIPTORS: (U) , ARCHITECTURE, COMPUTATIONS, CONFIGURATIONS, CONTROL SYSTEMS, HYPOTHESES, INFORMATION PROCESSING, LABORATORIES, LABORATORY PROCEDURES, LABORATORY TESTS, MAP READING, MAPS, MATCHING, ORIENTATION(DIRECTION), PHOTOGRAPHIC IMAGES, PHOTOGRAPHY, PHYSICAL PROPERTIES, PROBLEM SOLVING, RANGE(DISTANCE), RECONNAISSANCE, SIMULATION, STATIONS, TOPOGRAPHIC MAPS.

IDENTIFIERS: (U) *Map reading, Position finding, *Topographic maps, Information processing, Judgement(Psychology), Range(Distance), Slope, Navigation, Performance(Human), Mathematical models, PE61102F, WUAFOSR2313A4.

AD-A238 026

AD-A238 023 9/1

LOYOLA UNIV OF CHICAGO IL PARMLY HEARING INST

(U) Auditory Processing of Complex Sounds across Frequency Channels.

DESCRIPTIVE NOTE: Annual technical rept. 1 May 90-1 May 91,

MAY 91 8P

PERSONAL AUTHORS: Shofner, William P.; Dye, Raymond H.; Yost, William A.; Sheft, Stanley

CONTRACT NO. AFOSR-89-0335

PROJECT NO. 2313

TASK NO. A8

MONITOR: AFOSR, XF
TR-91-0804, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work has centered on the discovery of the MDI or Modulation Detection Interference phenomenon, in which the modulation properties of tonal components in multi-tone complexes can not be processed when all the tones are modulated at the same low modulation rate as well as when the tones are not modulated or when the modulation rates differ for different components. We have argued that MDI results from the fact that the coherent modulation of all of the components fuse them into a single auditory image, and since coherent modulation was the basis of the perceptual fusion, temporal modulation for any one tone is not easily processed. We recently tested a corollary to this assumption. That is, when tonal complexes are fused into an auditory image based on coherent temporal modulation and MDI occurs, can subjects still process other attributes of the tones (e.g. changes in frequency and intensity) since these other attributes were not the basis for the tones being fused into a single image.

DESCRIPTORS: (U) , AUDIO TONES, AUDITORY SIGNALS, CHANNELS, COHERENCE, DETECTION, FREQUENCY, FUSES(ELECTRICAL), HEARING, IMAGES, INTERFERENCE, LOW RATE, MODULATION, RATES, SIGNAL PROCESSING, SOUND.

AD-A238 023

AD-A238 023 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6.

AD-A238 010 12/2

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF COMPUTER SCIENCE

(U) Continuous Homotopies for the Linear Complementarity Problems,

APR 89 20P

PERSONAL AUTHORS: Watson, Layne T.; Bixler, J. P.; Poore, Aubrey B.

CONTRACT NO. AFOSR-85-0250

PROJECT NO. 2304

MONITOR: AFOSR TR-91-0560

UNCLASSIFIED REPORT

Availability: Pub. in SIAM Jnl. Matrix Anal. Appl., v10 n2 p259-277. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) There are various formulations of the linear complementarity problem as a Kadutani fixed point problem, a constrained optimization, or a nonlinear system of equations. These formulations have remained a curiosity since not many people seriously thought that a linear combinational problem should be converted to a nonlinear problem. Recent advances in homotopy theory and new mathematical software capabilities such as HOMPACK indicate that continuous nonlinear formulations of linear and combinatorial problems may not be farfetched. Several different types of continuous homotopies for the linear complementarity problem are presented and analyzed here, with some numerical results. The homotopies with the best theoretical properties (global convergence and no singularities along the zero curve) turn out to also be the best in practice.

DESCRIPTORS: (U) , ALGEBRAIC TOPOLOGY, CONVERGENCE, EQUATIONS, FORMULATIONS, GLOBAL, MATHEMATICAL PROGRAMMING, NONLINEAR ALGEBRAIC EQUATIONS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, OPTIMIZATION, THEORY.

IDENTIFIERS: (U) *Algebraic topology, *Linearity, *Combinational analysis, WUAFOSR2304, PE61102F.

AD-A238 010

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 009 13/9 12/1

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF COMPUTER SCIENCE

(U) Large Deformations of a Whirling Elastic Cable.

DESCRIPTIVE NOTE: Rept. for 1 Jul 89-1 Jun 91,

91 12P

PERSONAL AUTHORS: Wang, C.-Y.; Watson, L. T.

CONTRACT NO. AFOSR-89-0497

PROJECT NO. 2304

MONITOR: AFOSR
TR-91-0559

UNCLASSIFIED REPORT

Availability: Pub. in Acta Mechanics, v87 p45-57 1991. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Large Deformations of a Whirling Elastic Cable.

DESCRIPTORS: (U) *CABLES, *DEFORMATION, *ELASTIC PROPERTIES, *NUMERICAL ANALYSIS, NUMERICAL INTEGRATION, REPRINTS.

IDENTIFIERS: (U) *Whirling elastic cables, WUAFOSR2304, PE61102F.

AD-A238 009

AD-A238 008 12/2

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF COMPUTER SCIENCE

(U) Globally Convergent Homotopy Algorithms for Nonlinear Systems of Equations.

DESCRIPTIVE NOTE: Rept. for 1 Jul 89-1 Jun 91,

90 51P

PERSONAL AUTHORS: Watson, Layne T.

CONTRACT NO. AFOSR-89-0497

PROJECT NO. 2304

MONITOR: AFOSR, XF
TR-91-0558, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Nonlinear Dynamics, v1 p143-191 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Probability-one homotopy methods are a class of algorithms for solving nonlinear systems of equations that are accurate, robust, and converge from an arbitrary starting point almost surely. These new globally convergent homotopy techniques have been successfully applied to solve Brouwer fixed point problems, polynomial systems of equations, constrained and unconstrained optimization problems, discretizations of non-linear two-point boundary value problems based on shooting, finite difference, collocation, and Galerkin approximations to nonlinear partial differential equations. This paper introduces, in a tutorial fashion, the theory of globally convergent homotopy algorithms, describes some computer algorithms and mathematical software, and presents several nontrivial engineering applications.

DESCRIPTORS: (U) , ALGEBRAIC TOPOLOGY, ALGORITHMS, COMPUTER PROGRAMS, CONVERGENCE, ENGINEERING, EQUATIONS, MATHEMATICAL PROGRAMMING, NONLINEAR DIFFERENTIAL EQUATIONS, NONLINEAR SYSTEMS, OPTIMIZATION, PARTIAL DIFFERENTIAL EQUATIONS, POLYNOMIALS.

AD-A238 008

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A238 008 CONTINUED

IDENTIFIERS: (U) *Algebraic topology, *Algorithms, Partial differential equations, Nonlinear differential equations, WUAFOSR2304, PE61102F.

AD-A237 898 20/4

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Fluorescence Imaging of CO2 Laser-Heated Droplets,

JUN 90 4P

PERSONAL AUTHORS: Kwok, Alfred S.; Wood, Carol F.; Chang, Richard K.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0540, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters, v15 n12 p664-666, 15 Jun 90. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Fluorescence Imaging of CO2 Laser-Heated Droplets.

DESCRIPTORS: (U) *FLUORESCENCE, *IMAGES, *DROPS, CARBON DIOXIDE, REPRINTS, PROPULSION SYSTEMS, IRRADIATION, DISTORTION, LIQUID PHASES.

IDENTIFIERS: (U) WUAFOSR2308A3, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 897 9/3

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Shape Distortion of a Single Water Droplet by Laser-Induced Electrostriction,

OCT 88 4P

PERSONAL AUTHORS: Zhang, Jian-Zhi; Chang, Richard K.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0539, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters, v13 n10 p916-918 Oct 88. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Shape Distortion of a Single Water Droplet by Laser-Induced Electrostriction.

DESCRIPTORS: (U) *ELECTROSTRICTION, REPRINTS, LASER APPLICATIONS, LASERS, SURFACE TENSION, DROPS, SURFACE TENSION, OSCILLATION, SHAPE, SHAPE.

IDENTIFIERS: (U) WUAFOSR2308A3, PE61102F.

AD-A237 896 20/9 9/3

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Temporally and Spatially Resolved Spectroscopy of Laser-Induced Plasma from a Droplet,

JUL 88 4P

PERSONAL AUTHORS: Zheng, Jia-Biao; Hsieh, Wen-Feng; Chen, Shu-Chi; Chang, Richard K.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0538, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters, v13 n7 p559-561 Jul 88. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Temporally and Spatially Resolved Spectroscopy of Laser-Induced Plasma from a Droplet.

DESCRIPTORS: (U) *LASER PUMPING, *PLASMAS(PHYSICS), DROPS, WATER, DETONATION WAVES, REPRINTS.

IDENTIFIERS: (U) Laser induced plasmas, Laser induced breakdown, WUAFOSR230A3, PE61102F.

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 895 20/6

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Growth, Decay, and Quenching of Stimulated Raman Scattering in Transparent Liquid Droplets

89 8P

PERSONAL AUTHORS: Zheng, Jia-Biao; Hsieh, Wen-Feng; Chen, Shu-Chi; Chang, Richard K.

ONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0536, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Laser Materials and Laser Spectroscopy, p259-264 1989. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Growth, Decay, and Quenching of Stimulated Raman Scattering in Transparent Liquid Droplets.

DESCRIPTORS: (U) *LIGHT SCATTERING, *DROPS, RAMAN SPECTRA, NONLINEAR OPTICS, STREAK CAMERAS, QUENCHING(INHIBITION).

IDENTIFIERS: (U) SRS(Stimulated Raman Spectra), Laser induced breakdown, WUAFOSR2308A3, PE61102F.

AD-A237 894 20/6

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Pumping of Stimulated Raman Scattering by Stimulated Brillouin Scattering Within a Single Liquid Droplet: Input Laser Linewidth Effects,

JAN 90 9P

PERSONAL AUTHORS: Zhang, Jian-Zhi; Chen, Gang; Chang, Richard K.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0537, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the Optical Society of America B, v7 n1 p108-115 Jan 90. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Pumping of Stimulated Raman Scattering by Stimulated Brillouin Scattering Within a Single Liquid Droplet: Input Laser Linewidth Effects.

DESCRIPTORS: (U) *LIGHT SCATTERING, *DROPS, RAMAN SPECTRA, BRILLOUIN ZONES, LASER BEAMS, Q SWITCHING, REPRINTS.

IDENTIFIERS: (U) SBS(Stimulated Brillouin Scattering), SRS(Stimulated Raman Scattering), Ndiyag lasers, WUAFOSR2308A3, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 893 12/1

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF COMPUTER SCIENCE

(U) Least-Change Secant Update Methods for Underdetermined Systems,

OCT 90 37P

PERSONAL AUTHORS: Walker, Homer F.; Watson, Layne T.

CONTRACT NO. AFOSR-85-0250

PROJECT NO. 2304

MONITOR: AFOSR, XF
TR-91-0561, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in SIAM Jnl. of Numerical Mathematics, v27 n5 p1227-1282 Oct 90. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Least-change secant updates for nonsquare matrices have been addressed recently in (6). Here the use of these updates in iterative procedures for the numerical solution of underdetermined systems is considered. The model method is the normal flow algorithm used in homotopy or continuation methods for determining points on an implicitly defined curve. A Kantorovich-type local convergence analysis is given which supports the use of least-change secant updates in this algorithm. This analysis also provides a Kantorovich type local convergence analysis for least-change secant update methods in the usual case of an equal number of equations and unknowns. This in turn gives a local covergence analysis for augmented Jacobian algorithms which use least-change secant updates. In conclusion; the results of some numerical experiments are given.

DESCRIPTORS: (U) *ALGORITHMS, *DETERMINANTS(MATHEMATICS), MATRICES(MATHEMATICS), CURVES(GEOMETRY), TRACKING, PARAMETRIC ANALYSIS, REPRINTS.

IDENTIFIERS: (U) PE61102F.

AD-A237 893

AD-A237 892 21/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) Short Communication: Isolation of Buoyancy Effects in Jet Diffusion Flame Experiments,

90 12P

PERSONAL AUTHORS: Davis, R. W.; Moore, E. F.; Santoro, R. J.; Ness, J. R.

CONTRACT NO. AFOSR-87-0145

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0541, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Combustion Science and Technology, v73 p625-635 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Buoyancy is an important factor in the dynamic behavior of jet diffusion flames. In order to determine the exact role that buoyancy plays, a simple procedure is described for varying in isolation the relative buoyance force in stationary laboratory jet diffusion flame experiments. This procedure, which is derived from a theoretical model of these flames, merely requires that background pressure be varied while maintaining constant mass flows of fuel and oxidizer into the burner. It is shown that the sole result of these pressure variations in the theoretical model is that the effective gravitational acceleration acting upon the flame varies as the square of the pressure. Comparisons are made between the structure of a low speed laboratory methane/air flame at various pressures and the results of a direct numerical simulation of the same flame with various gravitational acceleration. Similar evolutions in flame structure are observed in both cases.

DESCRIPTORS: (U) *JET FLAMES, *BUOYANCY, DIFFUSION, REPRINTS, BURNERS.

AD-A237 892

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 892 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A237 892

AD-A237 864 22/2 12/1 20/6

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS DIV

(U) Experimental Verification of an Innovative Performance-Validation Methodology for Large Space Systems.

DESCRIPTIVE NOTE: Final rept. 15 Aug 87-14 Feb 91,

FEB 91 171P

PERSONAL AUTHORS: Hyland, David C.

CONTRACT NO. F49620-87-C-0108

PROJECT NO. 1200

TASK NO. K1

MONITOR: AFOSR, XF
TR-91-0232, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A technology gap exists in verifying performance of large space systems. To fill that gap the proposed program seeks to develop and validate an efficient pre-flight performance verification methodology. The approach involves selective component testing along with analysis of subsystem interactions. The methodology exploits MEOP (Maximum Entropy/Optimal Projection) Control System Design and Majorant Robustness Analysis. The approach is formulated for several representative large space systems and experimentally verified on a 3-meter diameter multi-hex panel ground-based active control tested.

DESCRIPTORS: (U) , EFFICIENCY, ENTROPY, FLIGHT, OPTIMIZATION, SPACE SYSTEMS, VERIFICATION.

IDENTIFIERS: (U) *Large space systems, MEOP(Maximum Entropy Optical Projection), Preflight performance-validation methodology, MHPE(Multi Hex Prototype Experiment), Mirrors, Vibration, WUAFOSR1200K1, PE63221C.

AD-A237 864

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 857 13/9

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF MECHANICAL ENGINEERING

(U) Performance and Stability in High Speed Articulated Structures Undergoing Quick Manuevers - Theory and Applications.

DESCRIPTIVE NOTE: Final rept. 1 Sep-31 Dec 91,

JAN 91 46P

PERSONAL AUTHORS: Amirouche, Farid M.

CONTRACT NO. F49620-89-C-0114

PROJECT NO. 1302

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0535, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The proposed research is divided into two phases. The first introduces the PUTD (Pseudo-Uptriangular-Decomposition) to reduce the governing equations of motion of articulated mechanical systems. This investigation proposes a new method, which allows the constrained systems to operate in the presence of singularities. This is achieved by regularization technique which makes use of a new representation of the kinematical and geometrical constraint equations at singular positions. This method of stability analysis is compared with the asymptotic stability presented by Baumgarte. The PUTD is extended to accommodate the dynamics of such systems. An illustration of the utility and effectiveness of the method proposed is shown through a two arm planar robot undergoing large motions and driven through singularities. The driving torques are then compared to check for discontinuities and jerks. The second phase of the research project set the stage for the testing of the proposed method when the articulated structures are composed of flexible bodies.

DESCRIPTORS: (U) , ASYMPTOTIC SERIES, DYNAMICS, EQUATIONS, FLEXIBLE STRUCTURES, MECHANICAL COMPONENTS, MOTION, STABILITY, STRUCTURES, TORQUE.

AD-A237 857

AD-A237 857 CONTINUED

IDENTIFIERS: (U) PUTD(Pseudo Uptriangular Decomposition), Articulated mechanical systems, Robotics, *Mechanical engineering, Stability, Regularization, Constrained multibody systems, Nonlinear dynamics, WUAFOSR1302B1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 858 12/4

PRINCETON UNIV NJ DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Analog Computation in Neutral Systems: Architectures and Complexity.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 88-31 Jul 90,

MAY 91 12P

PERSONAL AUTHORS: Dickinson, Bradley W.

CONTRACT NO. AFOSR-88-0227

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0554, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) First, we studied the representation problem for the class of single- hidden-layer feedforward networks, which is fundamental for understanding limitations of learning algorithms, and which also contributed to understanding the behavior of learning algorithms in applications involving low-complexity networks. The second kind of problem studied concerns dynamics behavior in neural networks containing feedback (trellis-structured networks in one particular applications). Our work focused on studying stability issues and exploring the implications of computational complexity theory. Third, the PAC learning paradigm (probably Almost Correct) was analyzed with the goal of characterizing the effects of statistically dependent sequences of training examples on learning performance. The goal of all these efforts was to discover and explore insights about fundamental limitations on the computational capabilities of analog neural systems and, where possible, of more general classes of physical systems as well.

DESCRIPTORS: (U) *NEURAL NETS, *ARCHITECTURE, *ANALOG COMPUTERS, NETWORKS, ALGORITHMS.

AD-A237 858

AD-A237 858 CONTINUED

IDENTIFIERS: (U) WUAFOSR2304A2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 851 21/2 21/9.2

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING

(U) Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities.

DESCRIPTIVE NOTE: Final rept. 1 Mar 89-28 Feb 91,

APR 91 47P

PERSONAL AUTHORS: Zinn, Ben T.; Daniel, Brady R.

CONTRACT NO. AFOSR-89-0290

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0600, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Primary research objectives are to: (1) investigate mechanisms responsible for driving of axial instabilities by solid propellant flames; (2) determine whether state-of-the-art theoretical models can predict characteristics of the flame driving mechanisms; and (3) investigate the effect of flow turning upon axial instabilities in solid propellant rocket motors. To attain these objectives, the response of diffusion flames, stabilized on the side wall of a duct, to imposed acoustic waves was investigated by using flame radiation measurements and laser Doppler velocimetry (LDV). Flame radiation measurements revealed that the presence of an acoustic field produced space dependent oscillatory heat release rates which depend upon characteristics of the flame and the excited acoustic field. Measurements of flame radiation and velocity field both showed that at a given instant some sections of the flame drive the acoustic field while others damp it. The net effect of the flame upon the acoustic field depends on the relative magnitude of these driving and damping regions. Validity of a previously developed flame response model was investigated by comparing measured and predicted oscillatory velocity components in the flame region. Using measured values of the acoustic admittance of the burner, flame shape, and steady state temperature

AD-A237 851

AD-A237 851 CONTINUED

distribution in the flame region, the model was used to predict oscillatory vertical velocity distributions in the flame region. These were then compared to velocity distributions measured with an LDV system, showing good qualitative agreement.

DESCRIPTORS: (U) , ACOUSTIC FIELDS, ACOUSTIC PROPERTIES, ACOUSTIC WAVES, ADMITTANCE, BURNERS, DAMPING, DIFFUSION, DISTRIBUTION, DOPPLER SYSTEMS, DRIVES, FLAMES, LASER VELOCIMETERS, MEASUREMENT, MODELS, OSCILLATION, RADIATION, REGIONS, RESPONSE, SHAPE, SIDES, SOLID PROPELLANT ROCKET ENGINES, SOLID PROPELLANTS, STATE OF THE ART, STEADY STATE, TEMPERATURE, THEORY, VELOCITY, VERTICAL ORIENTATION, WALLS.

IDENTIFIERS: (U) *Combustion stability, *Solid rocket propellants, *Flames, Oscillation, Mathematical prediction, Laser doppler velocimetry, Laser velocimeters, Length, Flow turning loss, Flame driving, PE61102F, WUAFOSK2308A1.

AD-A237 851

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 850 12/3

MISSOURI UNIV-ROLLA DEPT OF MATHEMATICS AND STATISTICS

(U) Reliability Assessment for One-Shot Devices Based on Repeated Samples.

DESCRIPTIVE NOTE: Final rept. 1 Jun 84-31 May 88,

MAY 88 8P

PERSONAL AUTHORS: Bain, Lee J.; Engelhardt, Max

CONTRACT NO. AFOSR-84-0184

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0818, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research findings during this grant period fall into two categories. The first category includes methods for repairable systems where repeated failures are modeled by either a nonhomogeneous Poisson process or else a compound nonhomogeneous Poisson process. The second category includes methods for nonrepairable systems. Papers in this second category are often useful in the analysis of repairable systems when applied to first-failure data. Such an anlaysis is often useful in the preliminary analysis of repairable systems when only early failure data is available.

DESCRIPTORS: (U) , FAILURE, POISSON EQUATION, RELIABILITY, REPAIR, TEST AND EVALUATION.

IDENTIFIERS: (U) *Statistical samples, *Failure, *Repair, Bibliographies, Reports, Abstracts, PE61102F, WUAFOSR2304A5.

AD-A237 850

AD-A237 849 6/5

NORTHWESTERN UNIV EVANSTON IL COLL OF ARTS AND SCIENCES

(U) Phosphoprotein Regulation of Synaptic Reactivity.

DESCRIPTIVE NOTE: Annual technical rept. 3 Jan 90-28 Feb 91,

MAY 91 9P

PERSONAL AUTHORS: Routtenberg, Aryeh

CONTRACT NO. AFOSR-90-0240

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0823, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The regulation of synaptic reactivity by protein kinase C and its substrates has been studied using the long-term potentiation paradigm (LTP). We have studied the effects of protein kinase C activators and inhibitors on behavior: imprinting in the chick and radial arm maze performance. The main conclusion to be drawn is that PKC is necessary but not sufficient fo the enhanced durability of memory. In combination with a neural signal, however, PKC demonstrates a profound synergism. Synergiam is also observed in the analysis of metal ion regulation of PKC activity. Calcium and zinc interact in their effect on the enzyme in a bidirectional manner. Significant accomplishments made during the period were: determining the effect of inhibitors on behavior and the species generality of PKC-F1 module in memory formation.

DESCRIPTORS: (U) , BEHAVIOR, CALCIUM, CONTROL, ENZYMES, INHIBITORS, IONS, MEMORY DEVICES, METALS, NERVOUS SYSTEM, REACTIVITIES, SIGNALS, SUBSTRATES, SYNAPSIS, SYNERGISM, ZINC.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, *Synaptic reactivity, Protein kinase C, Activators, Inhibitors, Synergism.

AD-A237 849

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 848 6/5

WRIGHT STATE UNIV DAYTON OH DEPT OF CHEMISTRY

(U) A Study of the Effect of Hydrocarbon Structure on the Induction of Male Rat Nephropathy and Metabolite Structure.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 90-31 May 91,

JUN 91 10P

PERSONAL AUTHORS: Serve, M. P.; Bombick, D. D.; Clemens, J. M.; McDonald, Gayle A.; Mattie, David R.

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0622, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The identification of the urinary metabolites have been identified using gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS). Histopathologic examination of the kidneys revealed minimal hyaline droplet formation (alpha 2u-g'obulin nephropathy) in the proximal tubule area from 2-methylheptane (2-MH). While 2,5-dimethylhexane (2,5-DMH) revealed moderate hyaline droplet formation in the renal proximal tubule. Work is currently progressing on the metabolism of 3-methylheptane. There are 16 separate metabolites which have been found, but only 3 have been identified. This molecule's metabolism is very complex. Pathological results indicate that it is more nephrotoxic than 2-methylheptane or n-octane, two structural isomers.

DESCRIPTORS: (U) , GAS CHROMATOGRAPHY, HISTOLOGY, HYDROCARBONS, ISOMERS, KIDNEY DISEASES, KIDNEYS, MALES, MASS SPECTROMETRY, METABOLISM, METABOLITES, MOLECULES, PATHOLOGY, RATS, STRUCTURAL PROPERTIES, TUBULAR STRUCTURES, URINE.

IDENTIFIERS: (U) PE61102F, WUAFOSRA312A5.

AD-A237 848

AD-A237 847 12/3

NORTHERN ILLINOIS UNIV DE KALB DEPT OF MATHEMATICAL SCIENCES

(U) Analysis of Nongaussian, Nonlinear Time Series with Long -Memory.

DESCRIPTIVE NOTE: Final rept. 30 Sep 88-31 Mar 91,

MAR 91 6P

PERSONAL AUTHORS: Pourahmadi, Moshen

CONTRACT NO. AFOSR-88-0284

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0617, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The project has been concerned with statistical analysis of certain time series and stochastic signals that are unusual, in that they have long memory and are nonGuassian. Standard statistical procedures, such as the Box Jenkins procedure which presumes Guassianity and short range dependence, when applied to these series will certainly produce inferior and suboptimal results. The PI pursued two approaches to address the twin problems of long memory and nonGuassianity. The first approach is rather general and it uses the setup of the Kolmogorov Wiener prediction theory of stationary processes. The second approach is more specific and it uses a random coefficient stochastic difference equation, which has a stationary solution with long memory and nonGuassian marginal simulating time series data with aforementioned properties. Such simulated data are used in verifying empirically the more general results obtained via the first approach.

DESCRIPTORS: (U) , BOXES, SHORT RANGE(DISTANCE), SIGNALS, SIMULATION, SOLUTIONS(GENERAL), STATIONARY, STATISTICAL PROCESSES, STOCHASTIC PROCESSES, TIME SERIES ANALYSIS.

IDENTIFIERS: (U) *Statistical analysis, *Time series analysis, PE61102F, WUAFOSR2304A5.

AD-A237 847

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 846 5/8 6/4

NEW YORK UNIV NY NEUROMAGNETISM LAB

(U) Cognition and the Brain.

DESCRIPTIVE NOTE: Annual technical rept. 15 Feb 90-14 Feb 91,

MAY 91 62P

PERSONAL AUTHORS: Kaufman, Lloyd; Williamson, Samuel J.

CONTRACT NO. AFOSR-90-0221

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0571, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Using an array of 14 superconducting magnetic field sensors we succeeded in establishing the locations of neuronal activity that produce the dominant alpha rhythm recorded in the electroencephalogram and magnetoencephalogram. Of particular interest is our observation that spontaneous alpha activity is suppressed over the visual area when a person is engaged in mental imagery, and over other functional areas when appropriate cognitive tasks are performed. Computer simulations of the changes in patterns of alpha field power reveal how the power map is related to the underlying cortical topography when suppression occurs. In studies of sensory evoked cortical activity, an analysis of published current source density measurements on animals provides information from which we obtain the first realistic measure for the spatial extent of cortical activity in human cortex when responding to sensory stimuli. Measurements with a 5-sensor system for chrominance and luminance stimuli shows that the sites of response in visual cortex coincide. The separation of color information processing apparently takes place at a later stage, if at all. Responses in human auditory cortex to appropriate sound stimuli reveal activity not previously identified, which has characteristics that suggest it is related to sensory memory functions.

AD-A237 846

AD-A237 846 CONTINUED

DESCRIPTORS: (U) *COGNITION, *BRAIN, MAGNETOENCEPHALOGRAMS, SENSORY DEPRIVATION, MEMORY(PSYCHOLOGY), MAGNETIC FIELDS, ELECTROENCEPHALOGRAPHY, RESPONSE, STIMULI, VISUAL CORTEX.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

AD-A237 846

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 844 20/4 12/2

WISCONSIN UNIV-MADISON CENTER FOR MATHEMATICAL SCIENCES

(U) Problems in Nonlinear Continuum Dynamics.

DESCRIPTIVE NOTE: Final rept. 15 Sep 87-14 Apr 91,

MAY 91 7P

PERSONAL AUTHORS: Slemrod, Marshall

CONTRACT NO. AFOSR-87-0315

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0594, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Slemrod's research in 1990-1991 centered on two issue: (1) the kinetics of coagulation processes, (2) behavior of discrete velocity models in the kinetic theory of gases. In the first area Slemrod has (a) given a new method for solving the special class of coagulation equations which exhibit gelatin and (b) derived and proved existences of similarity solutions for coagulation equations with diffusion. In the second area Slemrod has used his 'relaxed invariance principle' method to prove weak decay to equilibrium for the Broadwell model of gas dynamics in the case of specularly reflective boundary conditions.

DESCRIPTORS: (U) , BOUNDARIES, COAGULATION, DECAY, DYNAMICS, EQUATIONS, EQUILIBRIUM(GENERAL), GAS DYNAMICS, GASES, GELATINS, INVARIANCE, KINETIC THEORY, KINETICS, LOW STRENGTH, MODELS, NONLINEAR SYSTEMS, VELOCITY.

IDENTIFIERS: (U) Kinetics of coagulation processes, Discrete velocity models of gases, Nonlinear continuum dynamics, PE61102F, WUAFOSR2304A9, *Mathematics, Theory, Gelation, *Gas dynamics.

AD-A237 844

AD-A237 805 20/11

PURDUE UNIV LAFAYETTE IN SCHOOL OF MECHANICAL ENGINEERING

(U) Vibrations of Bladed Disk Assemblies.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Dec 90,

MAR 91 172P

PERSONAL AUTHORS: Nwokah, O. D.; Bajaj, A. K.

CONTRACT NO. AFOSR-89-0002

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0551, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The problems associated with uneven forced response vibration amplitudes in bladed disk assemblies is considered in the report. It is established that uneven vibration amplitudes arise principally by the destruction of cyclic-symmetry by some small perturbations usually within the component manufacturing tolerances. Such perturbations first split some of the eigenvalue degeneracies inherent in all cyclic systems. This split in turn gives rise to the modal bifurcation phenomenon. Particular forms of the modal phenomenon give rise to the uneven vibration amplitudes and under some restricted conditions to the mode localization phenomenon. In this report, group theory, singularity theory and singular perturbation theory are combined to give a complete analysis of uneven amplitudes and mode localization; as a prelude to blade vibration control.

DESCRIPTORS: (U) , AMPLITUDE, BLADES, CONTROL, CYCLES, DISKS, EIGENVALUES, GROUPS(MATHEMATICS), LIMITATIONS, MANUFACTURING, PERTURBATION THEORY, PERTURBATIONS, RESPONSE, THEORY, TOLERANCES(MECHANICS), VIBRATION.

IDENTIFIERS: (U) *Blades, Vibration, Modal bifurcation, Singularity theory, PE61102F, WUAFOSR2302B1.

AD-A237 805

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 798 7/2 20/12

MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING

(U) The Growth of Ultrathin Epitaxial Intermetallic Films.

DESCRIPTIVE NOTE: Technical rept. 1 Aug 89-31 Jul 90,

FEB 91 9P

PERSONAL AUTHORS: Cohen, P. I.

CONTRACT NO. AFOSR-89-0494

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0575, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The growth of iron aluminide and NiAl intermetallic compounds on III-V substrates has been studied using reflection high-energy electron diffraction (RHEED), transmission electron diffraction (TEM), and selected area electron channeling patterns (SAECP). Procedures for the growth of both of these intermetallics with layer-by-layer control were developed. The quality of the films on indium phosphides (100) substrates exceeds those grown on gallium arsenides (100) substrates due to the lower lattice mismatch. The films are stable to at least 820K. TEM measurements indicate that the burgers vector of misfit dislocations is a complete a(100) . SACP, TEM, and TEM indicate that the film relaxation approximates the Matthews Blakeslee prediction. Even this was surprising in light of the layer by layer growth after relaxation since the type of dislocation that forms cannot glide to the interface to relieve the strain. Preliminary semiconductor - intermetallic - semiconductor structures have been grown. The quality of the interfaces is being assessed.

DESCRIPTORS: (U) , DISLOCATIONS, ELECTRON DIFFRACTION, ELECTRON ENERGY, FILMS, GALLIUM ARSENIDES, GROUP III COMPOUNDS, GROUP V COMPOUNDS, GROWTH(GENERAL), HIGH ENERGY, INDIUM PHOSPHIDES, INTERFACES, INTERMETALLIC COMPOUNDS, IRON ALUMINIDE, LAYERS, QUALITY, REFLECTION,

AD-A237 798

AD-A237 798 CONTINUED

RELAXATION, SEMICONDUCTORS, STRUCTURES, SUBSTRATES, TRANSMITTANCE.

IDENTIFIERS: (U) *Intermetallic compounds, *Epitaxial growth, *Thin films, Nickel intermetallics, Electron diffration, Semiconductors, WUAFOSR2306B1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 798 6/4 8/5

YALE UNIV NEW HAVEN CT DEPT OF PSYCHOLOGY

(U) Levels of Processing of Speech and Non-Speech.

DESCRIPTIVE NOTE: Final rept. Sep 86-Mar 90,

MAY 91 20P

PERSONAL AUTHORS: Samuel, Arthur G.

CONTRACT NO. AFOSR-86-0357

PROJECT NO. 2313

TASK NO. A8

MONITOR: AFOSR, XF
TR-91-0553, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) These studies examined both signal-dependent factors, and listener-dependent factors. The examinations of signal factors include experiments on perceptual degradation due to signal interruption at critical rates (approximately 4cps), and studies mapping the early levels of representation of speech. The data support the existence of two qualitatively different early processing stages; the first is relatively peripheral and subject to neural fatigue, while the second is central and subject to criterion shifts. The studies of listener based factors include studies of perceptual restoration of deleted sounds (phonemes or musical notes), and studies of the perceptual effect of attentional allocation. The restoration experiments indicate similar architectures in the perceptual processing of speech and music. The attentional investigations demonstrate rather fine-tuned attentional control under high-predictability conditions. Significant progress has been made in achieving the research objective of clarifying the properties of complex auditory pattern recognition.

DESCRIPTORS: (U) , AUDITORY SIGNALS, DEGRADATION, FATIGUE, MAPPING, MUSIC, NERVOUS SYSTEM, PATTERN RECOGNITION, PERCEPTION, PHONEMES, PROCESSING, RATES, SPEECH.

AD-A237 798

AD-A237 798 CONTINUED

IDENTIFIERS: (U) *Auditory perception, Pattern recognition, *Auditory signals, *Information processing, Attention, Listening, Speech, *Psychoacoustics, Fatigue(Physiology), Music, Degradation, Interruption, Speech perception, PE61102F, WUAFOSR2313A8.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 795 20/2

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Laser Probing of the Kinetics and Dynamics of III - V Semiconductor Growth.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 90-31 Jan 91,

JAN 91 7P

PERSONAL AUTHORS: Leone, Stephen R.

CONTRACT NO. AFOSR-90-0166

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0572, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work is carried out on the dynamics of Ga, In, and As scattering, sticking, and desorption from silicon single crystals using laser induced fluorescence probing of the Ga and In atoms and As dimer gas phase species. Desorption kinetics are used to probe the InAs and GaAs heterostructures on silicon and the islanding behavior that occurs for the mixed systems. It is observed that islands form readily when In or Ga are grown on a prelayer of As on Si(100). State-resolved detection of As2 species is demonstrated by laser-induced fluorescence probing for the first time. Laser multiphoton ionization detection of the III-V semiconductor species is also demonstrated. A technique is being developed to measure surface migration rates of epitaxial species by using a two laser, desorption and detection scheme.

DESCRIPTORS: (U) , ATOMS, DESORPTION, DETECTION, DIMERS, DYNAMICS, EPITAXIAL GROWTH, GALLIUM ARSENIDES, GROUP III COMPOUNDS, GROUP V COMPOUNDS, GROWTH(GENERAL), LASER INDUCED FLUORESCENCE, LASERS, MEASUREMENT, MIGRATION, MIXING, PHOTOIONIZATION, RATES, REACTION KINETICS, SCATTERING, SEMICONDUCTORS, SILICON, SINGLE CRYSTALS, STRUCTURES, SURFACES, VAPOR PHASES.

IDENTIFIERS: (U) *Semiconductors, GaAs, InAs, Surfaces,

AD-A237 795

AD-A237 795 CONTINUED

*Lasers, PE61102F, WUAFOSA2306B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 794 20/8

HARVARD UNIV CAMBRIDGE MA DIV OF APPLIED SCIENCES

(U) The Effects of Luminance Boundaries on Color Perception.

DESCRIPTIVE NOTE: Annual rept. 15 Mar 90-14 Mar 91,

APR 91 19P

PERSONAL AUTHORS: Kronauer, Richard E.; Eskewm, R. T., Jr.; Stromeyer, C. F., III

CONTRACT NO. AFOSR-89-0304

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0544, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) When a suprathreshold luminance flash, presented as an increment on a large background field, accompanies a coincident equiluminant flash, the chromatic threshold is reduced. Early studies suggested that the chromatic facilitation grows large at small test size. We have measured detection thresholds for test spots with diameters from 5 min - 1 degree. Even for the smallest size the chromatic red-green sensitivity (specified in cone-contrast coordinates) is greater than luminance sensitivity, which has important implication for what the eye sees best . Facilitation by the luminance flash remains constant at 2x for all sizes contrary to other earlier studies. Further work with 1 degree flashes indicates that the facilitation results from a demarcation of the chromatic region by luminance features, and is not due to simple reduction of detection uncertainty. We also studied how the L and M cone signals combine in detecting motion.

DESCRIPTORS: (U) , BACKGROUND, BOUNDARIES, CHROMATICITY, COLOR VISION, CONICAL BODIES, DETECTION, EYE, FLASHES, LUMINANCE, REDUCTION, REGIONS, SENSITIVITY, SIGNALS, SIZES(DIMENSIONS), TEST AND EVALUATION, THRESHOLD EFFECTS, UNCERTAINTY.

AD-A237 794

AD-A237 794 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

AD-A237 794

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 793 7/4

CRYSTALLUME MENLO PARK CA

(U) Thermochemistry of Hydrocarbon Decomposition and Relationship to Properties of PECVD Diamond Films.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Jan 91,

MAR 91 47P

PERSONAL AUTHORS: Plano, Linda S.

CONTRACT NO. F49620-89-C-0009

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0569, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Considerable empirical research has been performed in the field of diamond film growth over the past fifteen years. However, this approach has proven insufficient in optimizing the deposition process. Also, no deposition mechanism has become universally accepted. A combination of in situ plasma diagnostic instruments, diamond film characterization, and computer modeling has been used to produce a self-consistent model of diamond-producing DC plasmas and to optimize the deposition process in terms of bonding type (i.e., graphite vs. diamond) and growth rate. The effects of important deposition parameters including methane concentration in hydrogen, current, electrode spacing, and pressure on both film and plasma characteristics have been analyzed. The presence of a negative electric field at the anode (or substrate electrode) has been determined to be necessary for the growth of high quality diamond films. The magnitude of this field is strongly dependent on pressure. Control of this field will be possible by monitoring with a Langmuir probe and controlling pressure, leading to in situ process control.

DESCRIPTORS: (U) , BONDING, COMPUTERIZED SIMULATION, CONSISTENCY, DECOMPOSITION, DEPOSITION, DIAGNOSTIC EQUIPMENT, DIAMONDS, ELECTRIC FIELDS, ELECTRODES, FILMS, GRAPHITE, GROWTH(GENERAL), HYDROCARBONS, HYDROGEN,

AD-A237 793 CONTINUED

LANGMUIR PROBES, MODELS, PARAMETERS, PLASMA DIAGNOSTICS, PLASMAS(PHYSICS), PRESSURE, RATES, SUBSTRATES, THERMOCHEMISTRY.

IDENTIFIERS: (U) Diamond, Deposition, Plasma diagnostics, Computer modeling, Film characterization, Langmuir probe, PE65502F, WUAFOS.

IAC NO. MT-010599

IAC DOCUMENT TYPE: MTIAC - MICROFICHE --

IAC SUBJECT TERMS: T--(U)*DIAMONDS, *DEPOSITION, *MODELING, SIMULATION, COMPUTERS, BONDING, /CODE D.;

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 792 9/5 20/12

KANSAS STATE UNIV MANHATTAN DEPT OF PHYSICS

(U) Persistent Photoconductivity in II-VI Mixed Semiconductors Related Critical Phenomena and *Applications*.

DESCRIPTIVE NOTE: Final rept. 1 Aug 90-31 Mar 91,

MAR 91 29P

PERSONAL AUTHORS: Jing, Hongxing

CONTRACT NO. AFOSR-90-0318

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0582, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period of Aug 1, 1990 to Jan 31, 1991, the following research activities have been carried out in studying persistent photoconductivity (PPC) in II-VI mixed semiconductors and related device applications: (1) New Type of Materials, (2) PPC in II-VI Semiconductor Thin Films, (3) Comparison Between II-VI and III-V Semiconductors and (4) PCC Transient Behavior. (Author)

DESCRIPTORS: (U) , GROUP III COMPOUNDS, GROUP II-VI COMPOUNDS, GROUP V COMPOUNDS, MIXING, PHOTOCONDUCTIVITY, SEMICONDUCTING FILMS, SEMICONDUCTORS, THIN FILMS, TRANSIENTS.

IDENTIFIERS: (U) *Persistent photoconductivity, *Group II IV semiconductors, Thin film semiconductors, Zinc cadmium tellurides, WUAFOSR2306B1, PE61102F.

AD-A237 790 12/3

CALIFORNIA UNIV RIVERSIDE

(U) Study of Various Problems in Statistical Planning.

DESCRIPTIVE NOTE: Final rept. 15 Dec 87-14 Dec 90,

DEC 90 6P

PERSONAL AUTHORS: Ghosh, Subir

CONTRACT NO. AFOSR-88-0092

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0547, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research done under the Grant AFOSR-88-0092 during the period December 1989 - December 1990 are (1) efficiency of connected binary block design when a single observation is unavailable (2) determination of optimal experimental conditions using dispersion main effects and interactions of factors in replicated factorial experiments (3) main effect plans with an additional search property for certain factorial experiments.

DESCRIPTORS: (U) , COMBINATORIAL ANALYSIS, DISPERSING, INTERACTIONS, OBSERVATION, OPTIMIZATION, PLANNING, SEARCHING, STATISTICS.

IDENTIFIERS: (U) *Factorial design, *Research management, Bibliographies, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 789 12/5

INDIANA UNIV AT BLOOMINGTON DEPT OF COMPUTER SCIENCE

(U) Data Compilation: Its Design and Analysis.

DESCRIPTIVE NOTE: Final rept. 15 Dec 88-14 Jun 90,

JUN 90 24P

PERSONAL AUTHORS: Franco, John; Friedman, Daniel P.

CONTRACT NO. AFOSR-89-0188

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0548, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of this research is to study the idea compilation and its impact on the development of concise, efficient, verifiable code. This entails developing, formalizing, analyzing, and extending a data compilation methodology based on work proposed. One goal of our study is to delineate the scope of applicability of data compilation techniques. Our purpose is similar to that of researchers studying functional transformations and partial computation. Regarding data compilation, the greatest success of this work has been the appreciation of the ideas; a variety of problems using extend-syntax in Scheme. The solutions we have obtained are concise, are of optimal complexity, and yet are relatively free of data structure considerations including boundedness and sparsity. The potential for solving a wider variety of problems in this style by adding features to Scheme has been shown to be great. We have proposed some new features and modifications to existing features which will be needed to manage data compilation more efficiently.

DESCRIPTORS: (U) , COMPUTATIONS, DATA ACQUISITION, DATA BASES, IMPACT, METHODOLOGY, OPTIMIZATION, TRANSFORMATIONS.

IDENTIFIERS: (U) *Data acquisition, *Coding, *Computer programming, PE61 102F, WUAFOSR2304A2.

AD-A237 789

AD-A237 788 6/5

ILLINOIS UNIV AT URBANA

(U) The Organization of the Suprachiasmatic Circadian Pacemaker of the Rat and its Regulation by Neurotransmitters and Modulators.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 90-31 Mar 91,

APR 91 18P

PERSONAL AUTHORS: Gillette, Martha U.; Medanic, Marija; Michel, Ann-Marie; Rea, Michael; Tcheng, Thomas

CONTRACT NO. AFOSR-90-0205

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0543, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research addresses the cellular organization and regulation of a biological clock that controls daily (circadian) rhythms of behavior (e.g., performance), physiology and metabolism in mammals. This clock, located in the brain's suprachiasmatic nucleus (SCN), can be removed in a slice of hypothalamus, maintained in a life support system for up to 3 days and studied directly. Using this approach, progress in year 1 of this award has been made in (1) localizing time-keeping properties within the SCN of rat, (2) establishing the regulatory role of serotonin, a neuromodulatory input from the brain's arousal center in the raphe nucleus, and (3) examining the release of excitatory amino acids from the optic tract in the region of the SCN. This project involves both individual and interactive research projects at the University of Illinois and the USAF SChool of Aerospace Medicine.

DESCRIPTORS: (U) , AMINO ACIDS, BIOLOGY, BRAIN, CELLS, CIRCADIAN RHYTHMS, CLOCKS, CONTROL, HYPOTHALAMUS, ILLINOIS, INTERACTIONS, LIFE SUPPORT SYSTEMS, MAMMALS, METABOLISM, MODULATORS, NEUROTRANSMITTERS, ORGANIZATIONS, PHYSIOLOGY, RATS.

AD-A237 788

AD-A237 788 CONTINUED

IDENTIFIERS: (U) *Brain slice, Circadian rhythm, Electrosphysiology, Excitatory amio acids, *Pacemaker, *Serotonin, PE61103D, AFOSR3484A4.

AD-A237 787 6/5

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Investigation of the Hepatotoxic and Immunotoxic Effects of the Peroxisome Proliferator Perfluorodecanoic Acid.

DESCRIPTIVE NOTE: Annual technical rept. 30 Sep 90-30 Apr 91,

APR 91 39P

PERSONAL AUTHORS: Frazier, Donald E.; Tarr, Melinda J.

REPORT NO. OSURF-723582

CONTRACT NO. AFOSR-90-0371

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0542, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our research efforts of the past six months have involved evaluation of the immunotoxic and toxic effects of perfluorodecanoic acid (PFDA). Eight day exposure to PFDA caused thymic atrophy with marked thymocyte depletion as well as decreased spleen cellularity at 50 mg/kg. Con A-induced T cell mitogenic responses were decreased at 20 mg/kg PFDA, but no effect on B cell proliferation was observed. Antigen-induced proliferation was decreased in both 20 and 50 mg/kg PFDA-exposed animals, although delayed-type hypersensitivity reactions did not vary significantly from control animals. Interestingly, IL-2 activity of cell culture supernates was increased with PFDA exposure, although NK cell activity was similar to control and lymphocyte subsets (Th and Ts/c cells) were not affected.

DESCRIPTORS: (U) , ATROPHY, CELLS, CONTROL, DAY, EXPOSURE(GENERAL), IMMUNOLOGY, LABORATORY ANIMALS, LYMPHOCYTES, SPLEEN, THYMUS, TOXICITY.

IDENTIFIERS: (U) *Perfluorodecanoic acid, *Immunotoxic, Thymic atrophy, Lympho-proliferation, Delayed-type

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 787 CONTINUED

hypersensitivity, NK Cell activity, Lymphocyte subsets, Interleukin 2, LPN-OSURF-788380/723582, PE61102F, WUAFOSR2312A5.

AD-A237 786 9/1

ARIZONA STATE UNIV TEMPE DEPT OF PHYSICS

(U) In-Situ Diffraction and Imaging Studies of Heteroepitaxial Growth of Semi-Conductors.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 87-31 Jul 90,

OCT 90 8P

PERSONAL AUTHORS: Bennett, Peter A.; Venables, John A.

CONTRACT NO. AFOSR-87-0378

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0581, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work emphasizes in-situ characterization of the initial stages of heteroepitaxial growth of semiconductors and ultrathin film silicides using advanced instrumentation and techniques, including high resolution reflection high energy electron diffraction (RHEED), a UHV scanning electron microscope with micro-probe RHEED and a UHV scanning transmission electron microscope with micro-probe RHEED and a UHV scanning transmission electron microscope (UHV-STEM). Systems of interest include vicinal Si(100), germanium on silicon, and ultrathin film silicides. Specific instrument and technique developments include: Demonstration that Auger lineshapes can be used to separate coexisting silicide phases in a partially reacted ultrathin film; Demonstration that quasi-kinematic RHEED intensity calculations can be used to identify epitaxial structures; Imaging of single atomic height steps with STEM; Visualization of submonolayers of germanium and various metals using biased secondary electron imaging; Auger imaging at the highest spatial resolution obtained anywhere.

DESCRIPTORS: (U) , AUGERS, COMPUTATIONS, DIFFRACTION, ELECTRON MICROSCOPES, ELECTRON MICROSCOPY, ELECTRONIC SCANNERS, ELECTRONS, EPITAXIAL GROWTH, GERMANIUM,

AD-A237 787

AD-A237 786

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 786 CONTINUED

GROWTH(GENERAL), HIGH RESOLUTION, IMAGES, INSTRUMENTATION, INTENSITY, METALS, PHASE, SEMICONDUCTORS, SILICIDES, SILICON, SPATIAL DISTRIBUTION, STRUCTURES, THIN FILMS, TRANSMITTANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A237 785 9/1

NOTRE DAME UNIV IN DEPT OF PHYSICS

(U) Vibrational, Mechanica, and Thermal Properties of III-V Semiconductors.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 90,

MAR 91 8P

PERSONAL AUTHORS: Dow, John

CONTRACT NO. AFOSR-89-0063

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0583, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Theories of the mechanical, vibrational, and electronic properties of III-V semiconductors have been developed and applied to (1) understanding the physics underlying the II-VI doping problem and suggesting band-gap engineering schemes for circumventing the problem; (2) making predictions of how the character of deep and shallow impurities can be different in superlattices from in bulk materials (3) understanding how surfaces of zincblende and wurtzite semiconductors relax, and how this relaxation depends on the ionicity of the semiconductor: (4) obtaining better insight into the properties of semiconducting alloys, both electronically and vibrationally, with attention paid to how ordering phenomena in these alloys affects their properties.

DESCRIPTORS: (U) , ALLOYS, BULK MATERIALS, DOPING, ELECTROMAGNETIC PROPERTIES, ENERGY BANDS, ENERGY GAPS, ENGINEERING, GROUP III COMPOUNDS, GROUP II-VI COMPOUNDS, GROUP V COMPOUNDS, PHYSICS, SEMICONDUCTORS, THERMAL PROPERTIES, ZINC SULFIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A237 783 20/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS SCIENCE AND ENGINEERIN G

(U) Post-Nucleation Heteroepitaxy in Poorly Lattice Matched Systems.

DESCRIPTIVE NOTE: Annual technical rept. 15 Oct 89-15 Oct 90,

NOV 90 17P

PERSONAL AUTHORS: Thompson, Carl V.

CONTRACT NO. AFOSR-85-0154

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0573, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have demonstrated a new mechanism for obtaining heteroepitaxial films, Epitaxial Grain Growth (EGG), which can lead to higher quality ultrathin epitaxial films than can be obtained by other techniques in systems with highly mismatched lattices. We have experimentally characterized this process in model materials systems and have shown that the observed orientation selectivity as well as the observed kinetic dependence or film thickness are consistent with the proposed surface- and interface-energy-driven mechanism. We have developed a computer simulation for EGG which is allowing us to determine which materials properties and processing conditions will lead to higher orientation selectivity and further reduced defect densities.

DESCRIPTORS: (U) , COMPUTERIZED SIMULATION, DENSITY, EPITAXIAL GROWTH, FILMS, GRAIN GROWTH, KINETICS, MODELS, ORIENTATION(DIRECTION), PROCESSING, REDUCTION, THICKNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A237 783

AD-A237 767 5/8 6/4

INDIANA UNIV AT BLOOMINGTON

(U) Institute for the Study of Human Capabilities: Summary Descriptions of Research for the Period December 1989 through September 1990.

DESCRIPTIVE NOTE: Final rept. 1 Nov 86-30 Sep 90,

MAY 91 61P

PERSONAL AUTHORS: Watson, Charles S.

CONTRACT NO. AFOSR-87-0089

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0564, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the third year of its URI/AFOSR support, two new psychophysical testing stations were used in cross-modality sensory and cognitive research and a third was constructed for auditory-visual projects. Initial experiments underway with these systems include a visual detection task with auditory cuing, a tactile-visual identification experiment, and a basic investigation of cross modality temporal acuity. A conference was planned during this period, to be held on March 21-23, 1990, on the subject of 'Human Error.' Conference co-chairpersons will be C.D. Wickens, and C.S. Watson. Other speakers include Herschel Leibowitz, David Woods, Peter Hancock and Susan Dumais, and from Indiana University, S.L. Guth, R. Shiffrin, J.T. Townsend, C.S. Watson, and D. Pisoni. This Institute, by these means, has provided partial support of research leading to the publication, during the past year, of sixteen journal articles and book chapters, and the presentation of nineteen papers at meetings of scientific societies. The Institute has also supported travel by faculty investigators to Air Force research facilities where they participated in discussions of current research projects. Institute investigators gave a series of research presentations to scientists visiting from Wright-Patterson Air Force Base.

AD-A237 767

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 767 CONTINUED

DESCRIPTORS: (U) *PERFORMANCE(HUMAN), *PSYCHOPHYSIOLOGY, COGNITION, SENSORY DEPRIVATION, CUEING, AUDITORY ACUITY, VISUAL ACUITY.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A4.

AD-A237 753 7/4

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Organometallic Precursor Routes to Si-C-Al-O-N Ceramics.

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-31 Mar 91,

MAY 91 78P

PERSONAL AUTHORS: Interrante, Leonard V.

CONTRACT NO. AFOSR-89-0439

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0586, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the results of a research program directed at the development of improved methods for the preparation of Si-C-Al-O-N ceramics using organometallic precursors. Two main approaches were employed in these studies, (1) co-pyrolysis of homogeneous mixtures of organosilicon and organoaluminum precursors and (2) pyrolysis of specially designed, single-component precursors containing both Si and Al. Depending on the choice of precursors and the pyrolysis atmosphere employed, nanocrystalline Beta-SiC/2H-AlN and Si3N4/AlN composites, 2H-SiC/AlN solid solutions, and various crystalline SiAlON phases were obtained as final ceramic products after annealing at 1400-1800 C the initially amorphous pre-ceramic phases obtained on pyrolysis to 1000 C.

DESCRIPTORS: (U) , ATMOSPHERES, CERAMIC MATERIALS, CRYSTALS, HOMOGENEITY, MIXTURES, ORGANIC COMPOUNDS, ORGANOMETALLIC COMPOUNDS, PHASE, PRECURSORS, PYROLYSIS, ROUTING, SILICON COMPOUNDS, SOLID SOLUTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

IAC NO. CE--002591

IAC SUBJECT TERMS: B--(0)B--(U)CERAMIC MATRIX COMPOSITES.

AD-A237 753

AD-A237 767

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 753 CONTINUED

CERAMIC MATERIALS, SIC(P)/ALN COMPOSITE, TIN(P)/BN COMPOSITE, SI3N4(P)/BN COMPOSITE, ALN(P)/BN COMPOSITE, SILICON CARBIDE, SILICON CARBON ALUMINUM OXYNITRIDE (SICALON), ALUMINUM NITRIDE, SILICON NITRIDE, TITANIUM NITRIDE, BORON NITRIDE, PRECURSORS, MICROSTRUCTURE, PROCESSING, SYNTHESIS, PYROLYSIS, SOLID SOLUTIONS, TGA, NMR, INFRARED SPECTROSCOPY, XRD;

AD-A237 722 12/1 20/11

CALIFORNIA INST OF TECH PASADENA FIRESTONE FLIGHT SCIENCES LAB

(U) Differential Equations and Continuum Mechanics.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

MAY 91 7P

PERSONAL AUTHORS: Cohen, Donald S.

CONTRACT NO. AFOSR-88-0269

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0557, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work has continued in two simultaneous veins. (1) Models have been developed to attempt to realistically account for recent observations involving new classes of polymerpenetrant systems. The attempt has been to account for their properties as they are currently being used in certain emerging technologies such as novel pharmaceutical delivery systems and separating membranes. (2) Since most of the new observations involve various aspects of non-Fickian diffusion coupled with viscoelastic mechanical properties, the mathematical models usually involve degenerate parabolic systems which give rise to new and fascinating types of mathematical behavior. They have provided the impetus to develop interesting analytical and numerical techniques.

DESCRIPTORS: (U) , BEHAVIOR, CONTINUUM MECHANICS, DELIVERY, DIFFERENTIAL EQUATIONS, DRUGS, MATHEMATICAL MODELS, MATHEMATICS, MECHANICAL PROPERTIES, NUMERICAL METHODS AND PROCEDURES, PARABOLAS, SYNCHRONISM, VEINS, VISCOELASTICITY.

IDENTIFIERS: (U) *Differential equations, *Continuum mechanics, PE61102F, WUAFOSR2304A4.

AD-A237 753

AD-A237 722

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 716 7/3 19/12

LASER PHOTONICS TECHNOLOGY INC AMHERST NY

(U) Chemical Processing of Novel Multifunctional Materials for Sensor Protection against Laser Threats.

DESCRIPTIVE NOTE: Final rept. 15 Sep 90-15 May 91,

MAY 91 28P

PERSONAL AUTHORS: Burzynski, Ryszard; Casstevens, Martin K.

REPORT NO. AFOSR-FR-LPT91

CONTRACT NO. F49620-90-C-0082

PROJECT NO. 1602

TASK NO. F1

MONITOR: AFOSR, XF
TR-91-0587, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) There is an immediate need for the development of materials that could function to protect human vision and light sensitive equipment from laser based weapons. The goal of the just concluded research was to synthesize a compound that would incorporate a nonlinear two photon absorbing functional group adjacent to a photoreactive moiety. This innovative approach would lead to broad band high optical transparency at lower power levels and efficient and fast attenuation at higher power levels. The use of organic compounds in this application ensures that the molecular structure could be further optimized by careful adjustment of the molecular structure. The synthesized compound, anthracene leuconitrile, was found to be photochemically unstable and took an inappropriately long time for the reconversion from the absorbing to the transmitting form.

DESCRIPTORS: (U) , ANTHRACENES, ATTENUATION, CHEMICALS, DETECTORS, EFFICIENCY, HIGH POWER, HUMANS, LASER WEAPONS, LASERS, LIGHT, LONG RANGE(TIME), LOW LEVEL, LOW POWER, MATERIALS, MOLECULAR STRUCTURE, ORGANIC COMPOUNDS, POWER LEVELS, PROCESSING, PROTECTION, SENSITIVITY, SYNTHESIS, THREATS, VISION.

AD-A237 716

AD-A237 716 CONTINUED

IDENTIFIERS: (U) *Anthracenes, *Protective equipment, *Defense systems, *Photochemical reactions, *Laser weapons, PE63221C, WUAFOSR1602F1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 710 20/2

NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF ELECTRICAL AND COMPUTER ENGINEERI NG

(U) Defect Reductions in Epitaxial Growth Using Superlattice Buffer Layers.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-30 Sep 90,

DEC 90 170P

PERSONAL AUTHORS: Bedair, Salah; El-Masry, N.

CONTRACT NO. AFOSR-88-0180

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0584, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The final report is based on the thesis of two Ph.D. students working in the area of defect reduction using strained layer superlattices. A variety of attempts to reduce the defects density in GaAs epitaxial films grown on Si substrates using annealing, InGaAs-GaAsP strained-layer superlattices, strained-layer superlattices combined with annealing, and the selective etching are presented. Both conventional furnace annealing/slow cooling and rapid thermal annealing were effective to eliminate microtwins and stacking faults. However, the conventional furnace annealing/slow cooling showed more promising results in terms of dislocations reduction. This conventional furnace annealing reduces dislocation density to about high 10 7 cm -2.

DESCRIPTORS: (U) , ANNEALING, BUFFERS, CRYSTAL LATTICES, DEFECTS(MATERIALS), DENSITY, DISLOCATIONS, EPITAXIAL GROWTH, ETCHING, FAULTS, FILMS, FURNACES, GALLIUM ARSENIDES, LAYERS, REDUCTION, REDUCTION OF AREA, STACKING, STUDENTS, SUBSTRATES, SUPERLATTICES, THERMAL RADIATION.

IDENTIFIERS: (U) WUAT-OSR2306B1.

AD-A237 710

AD-A237 708 11/2

TERRA TEK INC SALT LAKE CITY UT

(U) Compressive Stress-Induced Microcracks and Effective Elastic Properties of Limestone and Concrete. Phase 1.

DESCRIPTIVE NOTE: Final rept. 20 Aug 90-19 Feb 91,

APR 91 52P

PERSONAL AUTHORS: Zheng, Ziqiong; McLennan, John D.; Martin, J. W.

REPORT NO. TR-91-107

CONTRACT NO. F49620-90-C-0060

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0555, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Stress-induced microstructure alterations were observed in Indiana limestone and one type of using low wetting concrete, point metal alloy injection technique. Average microcrack length and aperture decreased with an increase in applied confining stress. Microcrack density increased with an increase in confining stress. Most microcracks were oriented at a small angle to the maximum compression direction. Theoretical solutions for effective moduli and Poisson's ratios of an axisymmetrically microstructured material were obtained using energy conservation principles. Results showed that all effective moduli are less than for the original undamaged and decreased with an increase in microcrack density. Ultrasonic velocities measured concurrently during static compression tests conformed the observations. 'Dynamic' stress-strain curves constructed from the measured ultrasonic velocities showed relatively similar behavior as the static stress-strain curves. Both static and dynamic moduli decreased with an increase in axial devatoric stress.

DESCRIPTORS: (U) , ACOUSTIC VELOCITY, ANGLES, COMPRESSION, CONCRETE, CURVES(GEOMETRY), DENSITY,

AD-A237 708

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85002

AD-A237 708 CONTINUED

DYNAMICS, ELASTIC PROPERTIES, ENERGY CONSERVATION, INDIANA, LENGTH, LIMESTONE, MICROCRACKING, POISSON EQUATION, RATIOS, SOLUTIONS(GENERAL), STATIC TESTS, STATICS, STRESS STRAIN RELATIONS, STRESSES, TEST AND EVALUATION, ULTRASONIC PROPERTIES, WETTING.

IDENTIFIERS: (U) *Concrete, *Limestone, *Compressive loading, * Microcracking, Crack propagation, Elastic properties, Modules of elasticity, Elastic waves, Stress strain relations, Construction materials, Ultrasonic tests, Failure(Mechanics), PE61102F, WUAFOSR3005A1.

IAC NO. NT-44853

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U) MICROCRACKS, ACOUSTIC VELOCITY, LIMESTONE, CONCRETE, ELASTIC PROPERTIES, STRESS STRAIN RELATIONS, COMPRESSION, MICROSTRUCTURE, TENSILE STRESS, ULTRASONICS, WAVES, WAVE VELOCITY, ELASTIC WAVES, P WAVES, SHEAR WAVES;

AD-A237 535 7/2 11/6

PITTSBURGH UNIV PA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.

DESCRIPTIVE NOTE: Final rept. 1 Jan 87-31 Oct 90,

APR 91 186P

PERSONAL AUTHORS: Meier, G. H.; Thompson, A. W.

CONTRACT NO. F49620-88-C-0013, DARPA Order-6155

MONITOR: AFOSR, XF
TR-91-0568, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Carnegie Mellon University, Department of Metallurgical Engineering and Materials Science, Pittsburgh, PA.

ABSTRACT: (U) Niobium aluminides and silicides as well as other intermetallic compounds have potential for use in advanced gas turbines where increased operating temperatures are necessary to obtain the targeted performance goals. These materials will be subjected to a variety of environments over a range of temperatures. Two of the principal reactants in these environments are oxygen and hydrogen. This program has been concerned with the effects of oxygen and hydrogen on niobium alloys and other selected intermetallic compounds. The investigations involving oxygen examined the mechanisms by which intermetallic compounds are degraded in oxidizing environments. Emphasis was placed upon the conditions which must be achieved in order to obtain sufficient oxidation resistance for use at temperatures above about 1100 deg C. Oxidation was investigated at temperatures between 500 and 1400 C in oxygen and in air. Investigations involving hydrogen have emphasized brittle fracture, crack growth and the behavior of hydrides in Ti-24Al-11Nb (at. %). Some work of this type was also performed on TiAl. The mechanical properties of these alloys were determined after exposure to hydrogen. Mechanical tests included simple tensile and compression tests, and notched bend and precracked compact tension specimens. Properties such as yield strength and ultimate

AD-A237 535 CONTINUED

strength, tensile strength, ductility, and fracture toughness have been determined as a function of both hydrogen (hydride) content and temperature.

DESCRIPTORS: (U) , ALLOYS, ALUMINIDES, BRITTLENESS, CRACK PROPAGATION, DUCTILITY, ENVIRONMENTAL IMPACT, ENVIRONMENTS, EXPOSURE(GENERAL), FRACTURE(MECHANICS), GAS TURBINES, HYDRIDES, HYDROGEN, INTERMETALLIC COMPOUNDS, MECHANICAL PROPERTIES, NIOBIUM, NIOBIUM ALLOYS, OXIDATION, OXIDATION RESISTANCE, OXYGEN, SILICIDES, TEMPERATURE, TENSILE STRENGTH, TENSION, TEST AND EVALUATION, TOUGHNESS, YIELD STRENGTH.

IDENTIFIERS: (U) *Intermetallic compounds, *Niobium alloys, Gas turbines, *Hydrogen, *Oxidation, Temperature, Microstucture, Grain size, Compressive strength, Brittleness, PE62712E, Titanium alloys.

AD-A237 457 9/1

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Center for Thin Film Studies.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-1 Jun 90,

JAN 91 140P

PERSONAL AUTHORS: Shannon, Robert R.

PROJECT NO. 3484

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0565, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report is for the entire term of operation of the URI Thin Film Center, including the six-month no-cost extension of the subject contract, and contains a summary of the research performed under this umbrella grant. Sections of this report address work on growth and characterization of thin films by various methods; modeling of thin film growth; and preparation and characterization of substrates for film growth. The Center for Thin Film Studies covered a wide range of research topics, from fundamental studies of growth to applications of processing methods. Also developed were new and improved analysis tools, such as Brillouin spectroscopy, Rutherford backscattering spectrometry, microreflectometry, and surface probes such as scanning tunneling microscopy. Practical properties of interest such as scattering and absorptive losses, surface roughness, and optical properties for a variety of materials have also been reported. The attached summary highlights the important advances of the three-and-a-half-year effort; for further details, the reader is referred to the bibliography and the articles listed therein.

DESCRIPTORS: (U) , ABSORBERS(MATERIALS), BACKSCATTERING, BIBLIOGRAPHIES, BRILLOUIN ZONES, COSTS, FILMS, GROWTH(GENERAL), LOSSES, METHODOLOGY, MICROSCOPY, PROBES, PROCESSING, RANGE(EXTREMES), SCANNING, SCATTERING, SPECTROMETRY, SPECTROSCOPY, SUBSTRATES, SURFACE ROUGHNESS, SURFACES, THIN FILMS, TUNNELING.

AD-A237 457 CONTINUED

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A3.

AD-A237 458 20/2 20/13 11/6

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Development of Model Based Magnetic LP-LEC Growth Large Diameter GaAs.

DESCRIPTIVE NOTE: Final rept. 14 Aug 87-28 Nov 90,

NOV 90 105P

PERSONAL AUTHORS: Witt, August F.

CONTRACT NO. F49620-87-C-0106

MONITOR: AFOSR, XF
TR-91-0580, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The stated objectives of this research effort were directed at: (1) The establishment of magnetic LP-LEC growth capability with diameters approaching 4 inches; (2) The design of heat and mass transfer control systems required for optimization of growth with magnetic melt stabilization, and (3) Development of a model-based growth control scheme which includes complementary knowledge-based system inputs for seeding, shouldering, and growth termination. A non-invasive wafer inspection system has been developed. It is based on NIR transmission microscopy with bright and dark field illumination. It provides for rapid quantitative characterization of doped and non-doped SI GaAs on both a macro- and selected microscale. Model-based control of thermal stresses in LEC growth of GaAs has been implemented. In this approach mathematical models of the growth process and a heat exchange system are used to control the temperature field in the crystal during growth and cooldown. Crystals grown in this configuration exhibit dislocation densities in the range of 1000/sq. cm. Also developed was a micro-mechanical constitutive law for high temperature creep and dislocation multiplication in GaAs.

DESCRIPTORS: (U) , BRIGHTNESS, CONTROL SYSTEMS, CREEP, CRYSTALS, DARKNESS, DENSITY, DISLOCATIONS, EXCHANGE, GALLIUM ARSENIDES, GROWTH(GENERAL), HEAT TRANSFER, HIGH TEMPERATURE, ILLUMINATION, INSPECTION, MAGNETIC FIELDS, MASS TRANSFER, MATHEMATICAL MODELS, MELTS, MICROSCOPY, MULTIPLICATION, OPTIMIZATION, STABILIZATION, TEMPERATURE,

AD-A237 458 CONTINUED

THERMAL STRESSES, TRANSMITTANCE, WAFERS.

IDENTIFIERS: (U) *Gallium arsenides, Doping, LEC(Liquid Encapsulated Crystals), Semiconductors, Mathematical models, *Crystal growth, *Heat transfer, Mass transfer, Defects(Materials).

IAC NO. NT-45043

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

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LEHIGH UNIV BETHLEHEM PA PACKARD LAB

(U) Three-Dimensional Vortex Dynamics and Interactions in Near-Wall Turbulent Boundary Layers.

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ABSTRACT: (U) A model of the three-dimensional dynamic physical processes that occur in the near-wall region of a turbulent flow at high Reynolds numbers is developed. The hairpin vortex is postulated to be the basic flow structure of the turbulent boundary layer. It is shown that the central features of the near-wall flow can be explained in terms of how asymmetric hairpin vortices interact with the background shear flow, with each other, and with the surface layer near the wall. The physical process that leads to the regeneration of new hairpin vortices near the surface is described, as well as the processes of evolution of such vortices to larger-scale motions farther from the surface. The model is supported by important developments in the theory of unsteady surface-layer separation and a number of 'kernel' experiments which demonstrate basic fluid mechanics phenomena relevant to the turbulent boundary layer. Explanations for the kinematical behavior observed in direct numerical simulations of low Reynolds number boundary-layer and channel flows are given.

DESCRIPTORS: (U) , BACKGROUND, BOUNDARY LAYER, CHANNEL FLOW, DYNAMICS, FLOW, FLUID MECHANICS, HIGH RATE, LAYERS, LOW RATE, NUMERICAL ANALYSIS, PHYSICAL PROPERTIES, REGENERATION(ENGINEERING), REYNOLDS NUMBER, SHEAR PROPERTIES, SURFACES, THREE DIMENSIONAL, THREE

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DIMENSIONAL FLOW, TURBULENT BOUNDARY LAYER, TURBULENT FLOW, VORTICES.

IDENTIFIERS: (U) *Vortices, *Turbulent boundary layer, Hairpin vortices, PE61102F, WUAFOSR2307A2.

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